skyways

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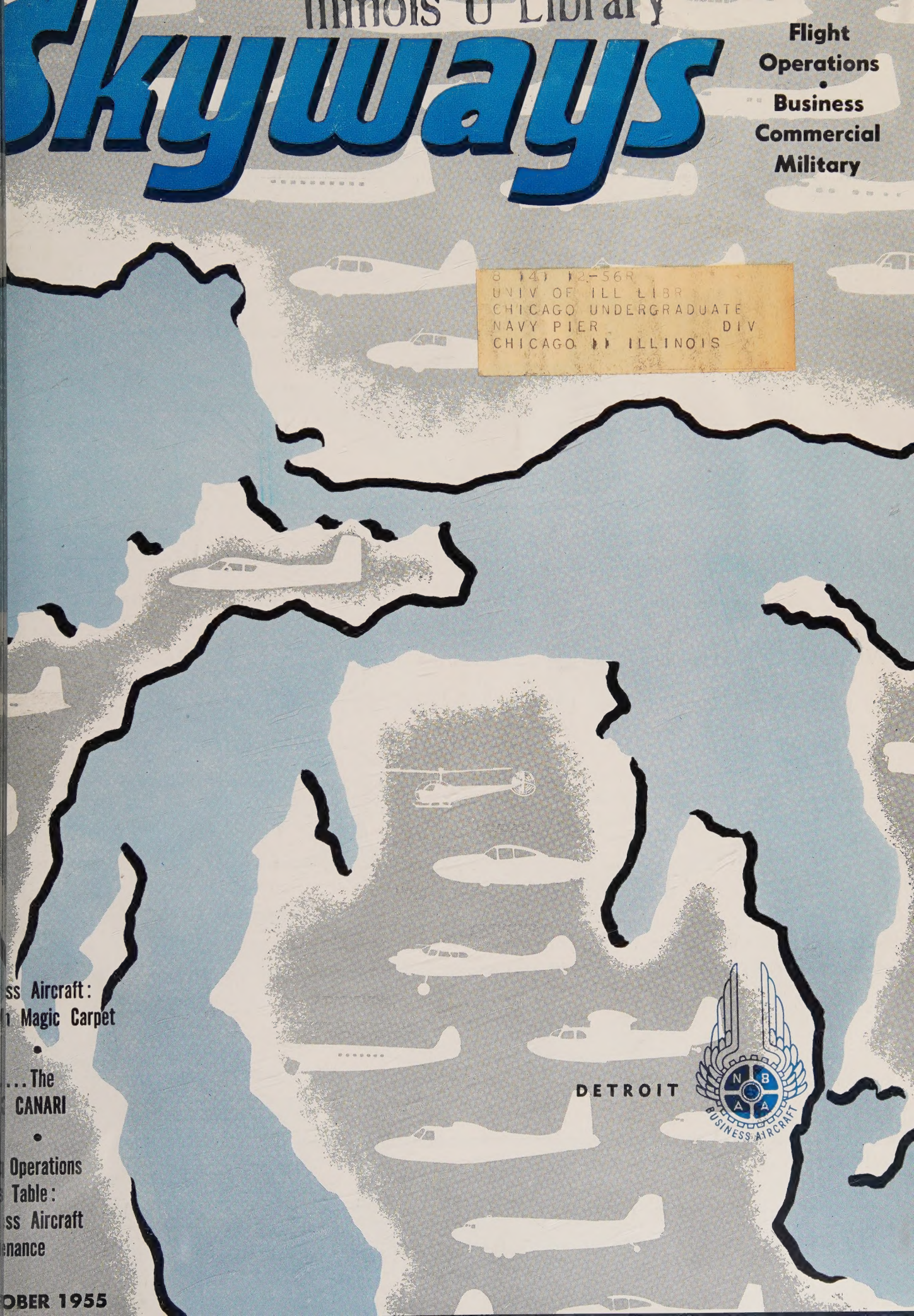
Military



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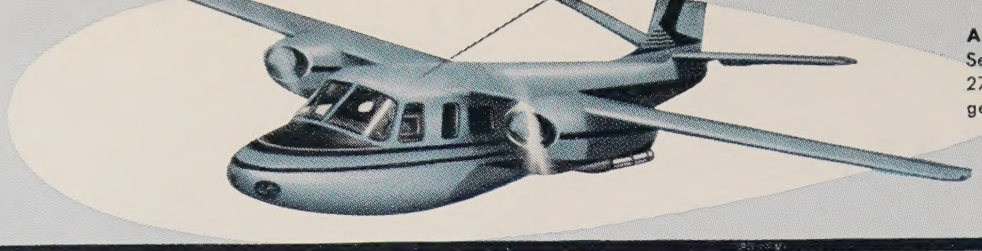
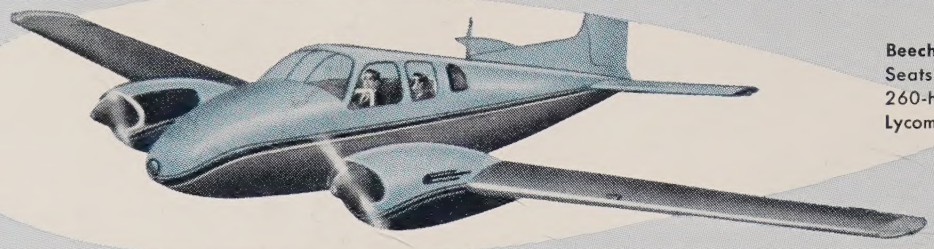
DETROIT

NBAA BUSINESS AIRCRAFT

OBER 1955



Aero-Commander.
Seats 5 to 7. Powered by tw
270-h.p. Lycoming air-coole
geared engines.



Beechcraft Twin-Bonanza.
Seats 6. Powered by two
260-h.p. air-cooled, geared
Lycoming engines.

Grumman Widgeon Conversion. Seats 6. Powere
by two 270-h.p. air-cooled,
geared engines by Lycoming

Safest "offices" over earth... powered by Lycoming

You are now looking at the "wings" carrying America into a great new era of safe, economical executive transportation. Each of these twin-engine, multi-passenger planes is powered by Avco's Lycoming Division ... long a leader in the up-to-500-h.p. engine field. Each has the double dependability of *two* air-cooled Lycoming engines—so powerful that the planes can safely fly and land with a full load *on one engine alone.* Small wonder that Lycoming powers 7 out of 10 of this year's twin-engine exec planes. In the past five years, Lyc has powered more than 9,000 exec aircraft—both twin and single engine

To fly any time, any place ... these a safest "offices" *over* earth ... the sou investments in executive aircraft *on*

For further information, write us on your head. Address Lycoming, Stratford, Co

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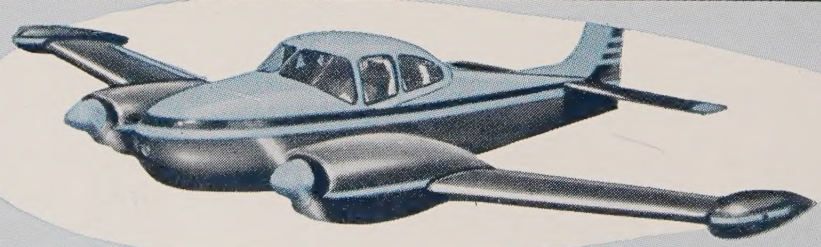
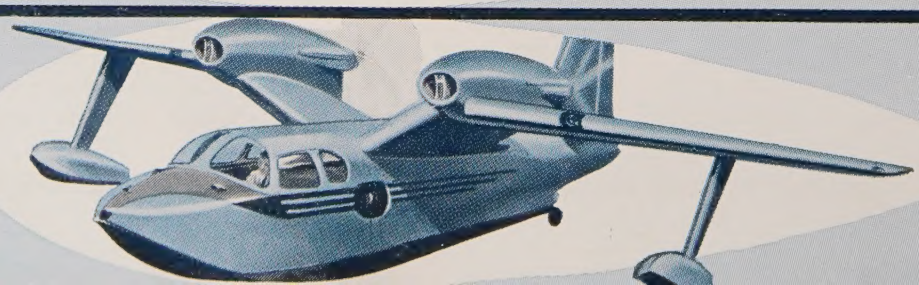
Piper Apache.
Seats 4. Dependably
powered by two 150-h.p.
air-cooled Lycoming engines.



Riley 55. Seats 4.
Powered by
two 170-h.p. air-cooled
Lycoming engines.



Royal Gull.
Seats 5. Powered by
two 270-h.p. air-cooled
Lycoming engines.

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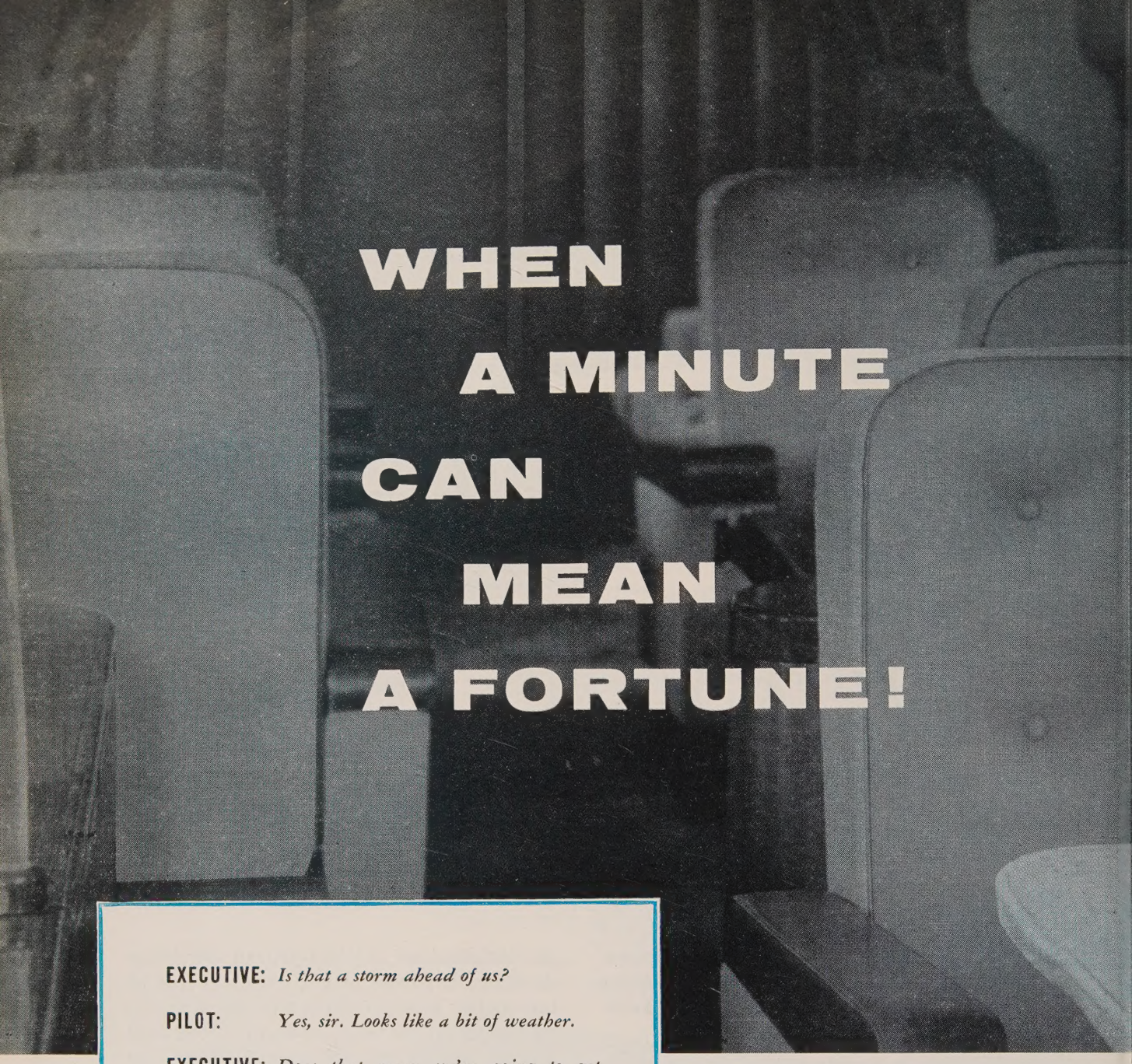


WHEN A MINUTE CAN MEAN A FORTUNE!

EXECUTIVE: *Is that a storm ahead of us?*

PILOT: *Yes, sir. Looks like a bit of weather.*

EXECUTIVE: *Does that mean we're going to get in late?*

PILOT: *I don't think so, sir. The radar shows we can make it without too much detouring. We should get in on time.*

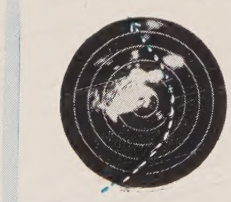
EXECUTIVE: *Good! This is one meeting I can't afford to miss.*

AT A TIME LIKE THIS—"When min are essential," an RCA Weather Radar (AVQ in your executive airplane can mean the di ence between a costly detour around st areas and reaching your destination on time maintaining your planned schedule.

Light in weight, low in cost, thoroughly pro RCA's Weather Radar belongs in too "standard-equipment" category. It presents pilot with an easily-interpreted display of s conditions as far as 150 miles ahead. By

; your pilot to "see" into storm areas along course, he can select non-turbulent paths en them, making long detours unneces- The AVQ-10 also provides for valuable d-mapping information, clearly showing andmarks as lakes, rivers, and coastlines.

w of the great and growing demand for AVQ-10 Weather Radar by leading air nd business aircraft operators, those inter- are invited to write for further particulars er to assure early installation.



Dotted line shows how airplane passes between storm cells in its flight path, therefore saving time and increasing passenger comfort.

Minutes and miles are saved by being able to find a smooth path through turbulent areas.

AVQ-10 antenna in the nose of airplane scans forward areas, enabling pilot to evaluate storm conditions far ahead.

COMMERCIAL AVIATION SALES

RADIO CORPORATION of AMERICA

ENGINEERING PRODUCTS DIVISION CAMDEN, N.J.

now hear this...

PERSONNEL

Sidney L. Shannon recently was elected a Senior Vice President, and **George A. Smith** was named Second Vice President and executive assistant to Mr. Shannon, Eastern Air Lines.

Armand J. Thieblot was elected a director of Vitro Corporation of America. **R. T. Ruder** has been made treasurer and **Junius H. Cooper,** controller of Vitro.

V. Charles Schorlemmer has been named Administrative Vice President of American Bosch Arma Corp, and **Leslie E. Neville** has been appointed Director of Public Relations and Advertising.

Al Harting has been named a Vice President of Southwest Airmotive, Dallas.

R. P. Brush and **Benton M. Garlow,** veteran test pilots, have joined Douglas Aircraft's Commercial Sales Division.

Herman Plone named chief engineer of Aircraft Standards, Inc., and **Edward J. Duggan** named assistant to general manager.

W. D. Rothell named District Manager of West Coast district of Stratoflex, Inc.

Capt. Edward F. Norman has been appointed Vice President-Operations for United States Overseas Airlines.

Allen E. Smith has been named chief engineer of the aviation department of Socony Mobil Oil Co.

Dr. Russell D. O'Neal has been named director of weapons system planning of Bendix Aviation Corporation. **L. L. Jones** has been named assistant to the general manager of the aircraft products division (Bendix-Eclipse of Canada, Ltd.).

Rear Admiral Arthur S. Born, USN (Ret.), joined Collins Radio as Assistant to Vice Pres., Research & Development.

Walter D. Sellers is now assistant sales manager of the Leach Relay Division of the Leach Corporation.

John M. Hughes has been appointed director of military operations of Riddle Airlines. **Dale A. Danielson** has been named superintendent of Riddle Airlines' new communications department.

Edward F. Houston was named Eastern Representative for Koehler Aircraft Products Company, a subsidiary of The New Britain Machine Co.

William E. Hibbard has joined Superweld Corporation as Applications Engineer.

Ray J. Benecchi was elected a Vice President of Lear, Inc., and also appointed Division General Manager of the Grand Rapids Division.

Francis H. Barnard has been named controller for Northrop Aircraft, Inc.

William Patterson, Jr., was appointed a jet engine specialist at Vickers Inc.

Frank Lynott was named vice president of freight operation, and **John Higgins** was appointed assistant vice president of sales of The Flying Tiger Line.

William F. Lange promoted to newly created position of assistant to vice president and general manager of Servel, Inc.

William B. Voisard has been made chief engineer of McCauley Industrial Corporation. **Hugh V. Schierling** has been named distributor sales manager.

Harry Stolar recently was appointed

(*Continued on page* 10)

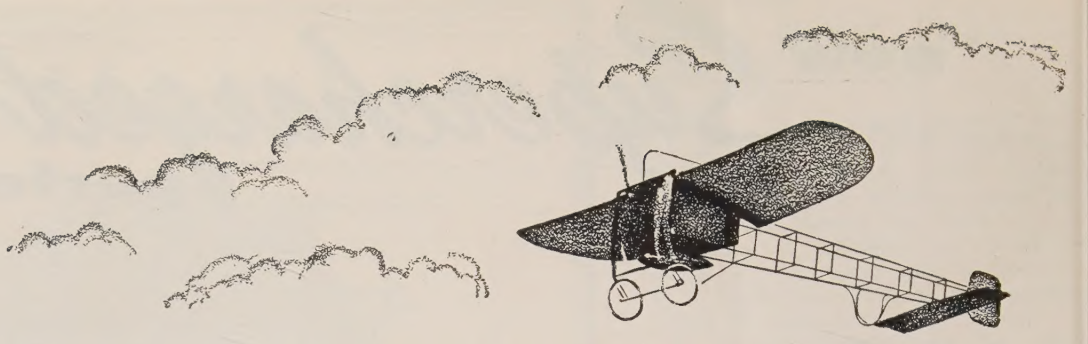
now Supercharged performance

MORE SPEED—230 m.p.h. @ 70% power (260 m.p.h. maximum). **MORE RANGE**—1400 miles normal range (1600 miles maximum). **MORE LOAD**—7,000 lbs. gross (2750 lbs. usable). These are but three of the outstanding features in the new supercharged

AERO Commander -680- Super

For complete information see your nearest Aero Commander distributor or write for Catalog 126-S

AERO DESIGN & ENGINEERING CO • TULAKES AIRPORT • P.O. BOX 118 • BETHANY, OKLAHOMA



You CAN Afford Travel Safety

Aunt Mehitabel's ideas about "flying machines" are as outmoded as her hats

Modern personal and executive airplanes have a safety record that is superior to that of motor cars *by a ratio of about five to one.*

No one who has experienced the pleasure of flying straight to his destination in a BEECHCRAFT at a speed of from 180 to 215 miles per hour will be content to fight traffic at 40 or 50 miles per hour on the ground, around devious routes.

The cost of a Bonanza is greater than a top-grade car, but it delivers more miles per gallon, and owners often depreciate it over 500,000 miles of use. If usage is reasonably high, the cost per mile is very little more than that of a fine motor car.

You *really can* afford travel safety. For complete details, see your BEECHCRAFT dealer or distributor, or write to Beech Aircraft Corporation, Wichita, Kansas.

★ASK ABOUT BEECHCRAFT'S NEW EXCLUSIVE LEASING PLAN.

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

OCTOBER, 1955

Skyways

The Magazine of Flight Operations

FOUNDED BY J. FRED HENRY, 1942

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industry notes . . .

■ Royal Aircraft began production and marketing of its new five-place amphibian, the Royal *Gull*, in August. A business amphibian, the *Gull* is powered by two Lycoming 270-hp engines equipped with three-blade, constant-speed, full-feathering Hartzell props, and has a cruising speed of 160 mph at 70% power. Its top speed is 184 mph; empty weight is 4300 lbs, gross is 6000 lbs, useful load, 1700 lbs.

■ Convair has been awarded a production contract by the USAF for F-102A jet interceptors and TF-102A combat proficiency trainers. This is the third order placed with Convair for the supersonic delta wing F-102A, and the second involving the TF-102A trainers.

■ Link Aviation, Inc., recently delivered to Patrick AFB, Florida, the first simulator for guided missile crew training. Link device is designed to train crews in guidance and control of the Martin *Matador* ground-to-ground tactical missile. The trainer is trailerized, and is used in conjunction with two other AF trailerized units, one a radar station and the other a missile controller's station.

■ Bell Aircraft Corp and Nuclear Science and Engineering Corp have entered into an agreement whereby Nuclear Science and Engineering will provide nuclear assistance and advice to Bell. Purpose of the relationship between the two corporations is to evaluate the applicability of nuclear techniques to Bell Aircraft's present programs.

■ The Fletcher FU-24 *Utility* has been certified by the CAA as the first agricultural, cargo-carrying, and passenger-carrying aircraft to be licensed in this country. The certification permits use of the airplane in the U.S. for almost any conceivable purpose in the utility and passenger-carrying class. The FU-24 is now in volume production.

■ Solar Aircraft has announced a contract with Bristol Aeroplane Co., Ltd, under which Solar will lend its jet engine afterburner knowledge to the British firm. The agreement covers Bristol's use of Solar's developments in afterburner design.

■ Southwest Airmotive, Dallas, has completed its tooling for the J33 jet overhaul work and puts its first engines through. Since becoming the first civilian base to receive a jet engine overhaul contract, Southwest has built new facilities at both Love and Amon Carter Fields, trained its personnel, phased out its Air Force piston engine overhaul contract, completed the tooling and puts its first J33's through overhaul . . . all in record time, 150 days.

■ The AC Spark Plug Division of General Motors has designed and built a new time-, labor- and space-saving aircraft spark plug reconditioning unit. The new unit can be used for 10 separate servicing operations: wire-brush cleaning the lower and upper spark plug threads; sandblast cleaning the lower portion of the insulator; scour-cleaning the upper portion of the insulator; washing and drying; setting the electrode gap; testing for gas leakage; electric testing the insulator; testing the resistance of the center wire; visual inspection of spark plugs; and greasing of threads. Although designed especially for the commercial airlines, the new unit promises to be of great value to aircraft companies. One operator can service 500 plugs in eight hours.

■ The USAF's jet-powered VTO developed by Ryan Aeronautical has been delivered to Edwards AFB to undergo flight tests. Ryan has been working on this jet VTO project for more than six years, and it represents the first military VTO aircraft powered by a jet engine rather than the gas turbine engine driving a propeller.

■ The experimental Boeing turboprop XB-47D, the first of two *Stratojets* modified at the request of the AF to serve as test beds for the CW T49 engine, recently made its first flight at Seattle. The *Stratojet* has been modified to a four-engine airplane, with the T49 turboprops replacing the four inboard engines in their double "pods." The outboard engines are GE J47's.

— Editorial —

SKYWAYS salutes

THE NATIONAL BUSINESS AIRCRAFT ASSOCIATION

In the field of aviation, the rapid and constant growth of business flying represents an achievement unequaled in any other phase of the industry. In its infancy just a few years ago, industry's air fleet today is at least ten times larger than the domestic commercial fleet. Company-owned planes, used for business purposes, total well over 10,550, according to the CAA. The total number of planes used by individuals for business activities is well over 24,000 . . . and that figure does not include the leasing of aircraft, making the total even greater!

Business aviation not only has come "of age" but has developed into a multi-million dollar annual market of inestimable value to the national economy.

All too frequently, recognition for successful accomplishment is either belated or entirely missing. In almost any field of endeavor, most of us are prone to take for granted the *results*, especially when they are favorable, with scant consideration for the planning, the energy and the plain hard work which has helped make the results possible.

The NBAA has played—and is playing—an important part in the development and growth of this great and soaring phase of aviation. With its distinguished membership of major corporations, companies and prominent individuals covering over fifty types of commercial enterprise, it serves as an authentic "Voice" for all engaged in the use of aircraft for business. The Association provides representation at the national level, protects and safeguards the legitimate interests of all who fly business planes, and is an effective medium for the interchange and dissemination of technical information.

SKYWAYS is proud of the NBAA and the magnificent job it has done and is doing. We are appreciative too of the long and close relationship which exists between our publication and the Association.

SKYWAYS salutes the NBAA and extends sincere wishes for its continued growth and success!

Max J. Fred Henry

now hear this...

assistant general manager of the Marshall-Eclipse division of Bendix Aviation.

HONORS

Ralph S. Damon, President of TWA, has been named recipient of the ASME Spirit of St. Louis medal "for meritorious service in the field of aeronautics."

George R. Mellinger, chief of engineering flight test facilities at North American Aviation, was elected chairman of Institute of Aeronautical Sciences' L. A. Section.

Arthur C. Storz, Omaha business and civic leader, was named the Air Force Association's "Man of the Year," and presented a trophy.

COMPANIES

Wilcox Electric Company, Inc., Kansas City, Mo., has acquired the exclusive world-wide manufacturing and distribution rights for the airborne Air Traffic Control Transponder (Radar Safety Beacon) designed by Melpar, Inc.

Curtis-Wright Corporation has received orders for 500 turbo-compound engines for use in overseas version of DC-7.

Pacific Airmotive Corp. has announced a new service arrangement with Pratt & Whitney Aircraft. PAC will supply skilled personnel to handle servicing and maintenance of engines in the latest type McDonnell and North American jet aircraft.

Mohawk Airlines is installing Narco DME in fleet of 3 Convairs and 10 DC-3's.

Aviation Financial Services, Inc., a new financial agency, was formed to specialize in financing civil aircraft equipment needs. **Harold R. Harris** heads organization.

Van der Horst Corp. is establishing plant facilities in Chicago. New plant is expected to be in production early in 1956.

Aerodex, Inc., has been awarded two contracts approximating $4,000,000 by the USAF for overhaul of aircraft engines.

Fairchild Aircraft Division has been awarded a new Air Force contract for modifications of more than 200 C-119's.

AERO CALENDAR

Oct. 5-7—National Business Aircraft Assn Eighth Annual Meeting and Forum, Sheraton-Cadillac Hotel, Detroit.

Oct. 5-7—1955 National Airports Conference, sponsored by AAAE and University of Oklahoma, Norman, Okla.

Oct. 11-15—Society of Automotive Engineers, Golden Anniversary Aeronautics Meeting, Aircraft Production Forum and Engineering Display, Hotel Statler, L. A.

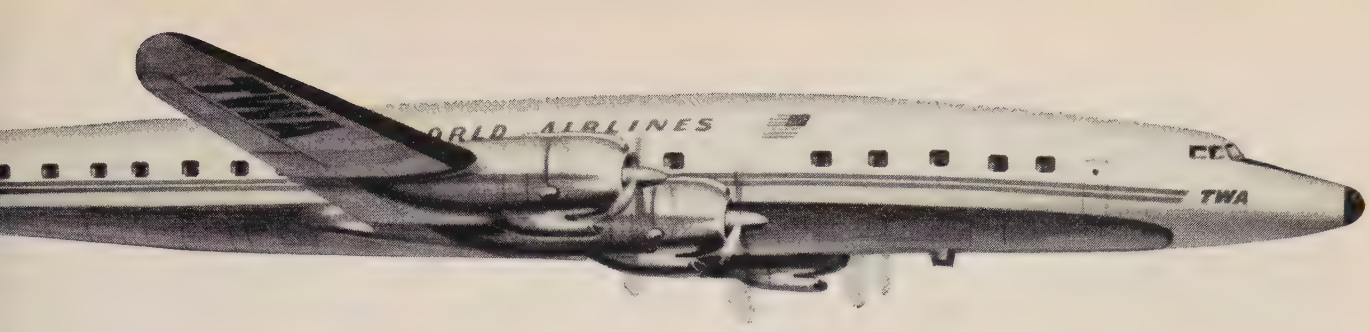
Oct. 17-21—International Air Transport Assn, 11th Annual General Meeting, Waldorf-Astoria Hotel, New York.

Oct. 11-13—Air Transport Association, engineering and maintenance conference, Dallas.

Oct. 11-15—National Association of State Aviation Officials, Annual Meeting, Dallas.

Oct. 25-27—American Institute of Electrical Engineering, technical conference on aircraft electrical applications, Hollywood Roosevelt Hotel, Los Angeles.

Oct. 31-Nov. 1—East Coast Conference on Aeronautical and Navigational Electronics, sponsored by IRE, Baltimore, Md.



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Fly TWA's great new SUPER-G CONSTELLATIONS

QUIETEST, MOST LUXURIOUS LONG-RANGE AIRLINERS IN THE WORLD!

At no extra fare, enjoy the finest non-stop service ever offered between major cities coast to coast and to Europe!

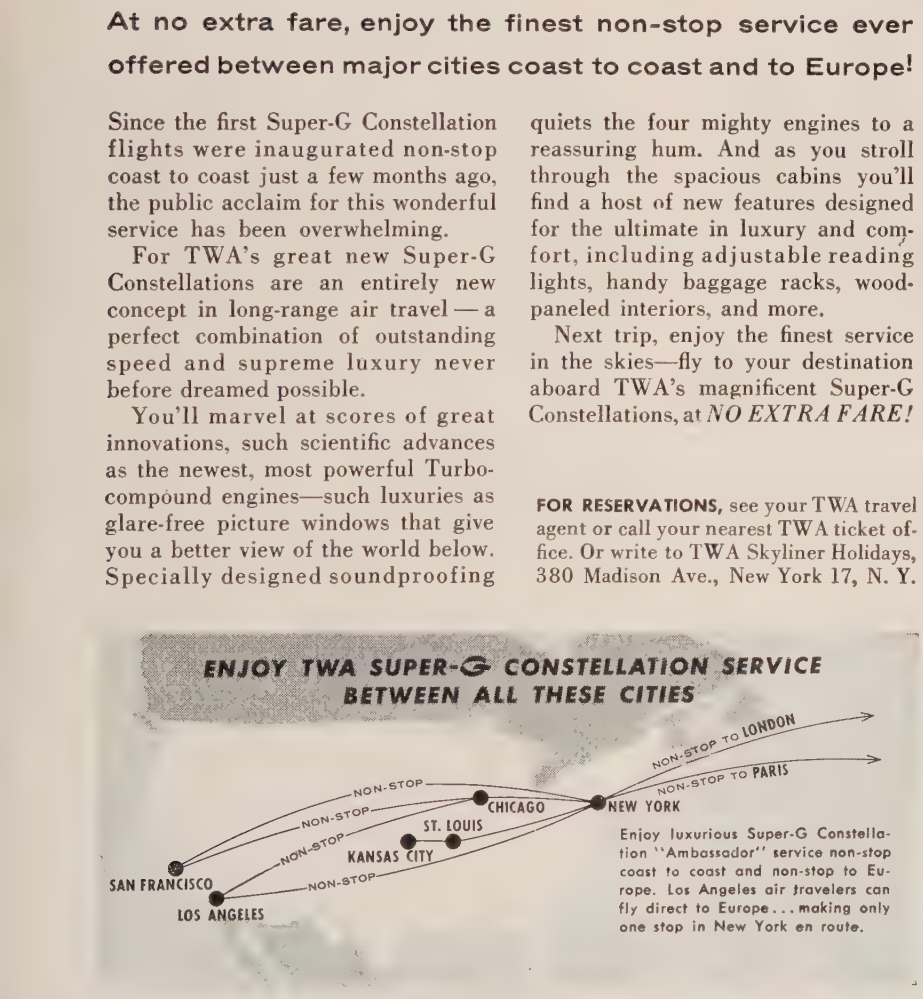
Since the first Super-G Constellation flights were inaugurated non-stop coast to coast just a few months ago, the public acclaim for this wonderful service has been overwhelming.

For TWA's great new Super-G Constellations are an entirely new concept in long-range air travel — a perfect combination of outstanding speed and supreme luxury never before dreamed possible.

You'll marvel at scores of great innovations, such scientific advances as the newest, most powerful Turbo-compound engines—such luxuries as glare-free picture windows that give you a better view of the world below. Specially designed soundproofing quiets the four mighty engines to a reassuring hum. And as you stroll through the spacious cabins you'll find a host of new features designed for the ultimate in luxury and comfort, including adjustable reading lights, handy baggage racks, wood-paneled interiors, and more.

Next trip, enjoy the finest service in the skies—fly to your destination aboard TWA's magnificent Super-G Constellations, at *NO EXTRA FARE!*

FOR RESERVATIONS, see your TWA travel agent or call your nearest TWA ticket office. Or write to TWA Skyliner Holidays, 380 Madison Ave., New York 17, N. Y.



Fly the finest . . . **FLY TWA**
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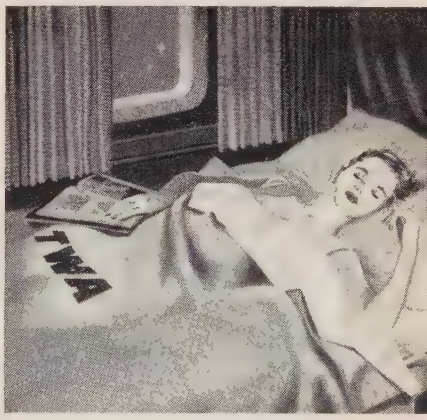
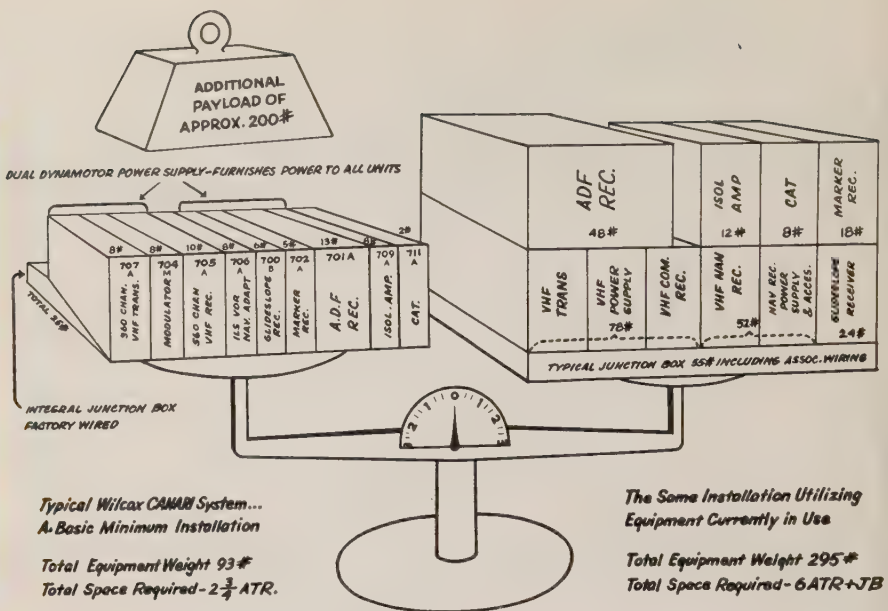
Finest food in flight! Enjoy superb full-co meals served right at your seat by your TWA hos Between meals, select a perfect snack from TW bountiful variety of canapés, cheeses and fresh fr Drinks available on all Super-G flights—no charg "Ambassador" flights.



Sleep away the miles in a wide, full-length b that's even roomier than a rail berth. Have break in bed if you wish. It's the only air sleeper ser between New York and California. And it's now scheduled in non-stop "Ambassador" service Europe, too.

MEET THE WILCOX CANARI



Wilcox introduces its new concept in aircraft electronics: the Communications And Navigation Airborne Radio Instrumentation System

Two and one-half years ago the Wilcox Engineering Development Laboratories were assigned one of the most important projects in their history: design an airborne electronics "package" system in which each element is completely compatible with all the other elements; reducing weight and size as far as practicable by the use of modern miniature components and new techniques in circuit design, fabrication, and packaging, but at no sacrifice in the performance, reliability, and maintain-ability demanded by the airlines. The project is now virtually complete, and the finished designs ready to transfer from Engineering to the Production Department. The result: The Wilcox Communications And Navigation Airborne Radio Instrumentation (CANARI) System.

The CANARI is a new concept in aircraft electronics. It is the next logical step in a sequence that began over 27 years ago. During the latter part of 1928 and early 1929, Herbert Hoover, Jr., the Communications Superintendent for Western Air Express (which later combined with Transcontinental Air Transport to become Transcontinental & Western Air, and finally Trans World Airlines), and Thorpe Hiscock, his counterpart in Boeing Air Transport (now United Airlines), successfully installed high-frequency, two-way radiotelephone equipment in commercial transport aircraft operated by their companies. Other potential uses for electronic devices were promptly envisioned, and in the process of their successful creation a new branch of the electronics industry was born. This new industry, of which the Wilcox Electric Company of Kansas City, Missouri is a prominent member, has met the challenge with typical American ingenuity. The electronic package on current transport aircraft contains, in addition to the modern descendents of that early high-frequency radiotelephone unit, the more recently developed VHF and UHF communications systems, plus a wide assortment of navigational aids and automatic controls.

As each new piece of equipment was perfected by one of the various manufacturers, accepted and purchased by the aircraft operators, it was necessary for an installation engineer to integrate the new item into a system that was already composed of a somewhat confusing collection of units having a wide variety of shapes, sizes and electrical characteristics. Most of the items were designed as individual, self-sufficient assemblies, each complete with its own shockmount, dynamotor power supply, audio amplifying circuits, and (where appropriate) modulator. Such a system is extravagent in three ways other than cost: 1) weight, 2) space, and 3) installation engineering talent. In order to properly integrate the various "bits and pieces" into an electronics system, the airlines and larger corporate fleet operators have been forced to employ a staff of electronics engineers. The corporate operator, however, with a fleet too small to justify such an expense, had to search for a competent contract service where he could have such engineering done.

In recognition of this integration problem, and also in order to establish industry standards of performance and interchangeability, the scheduled airlines, created a permanent committee which is composed of electronics engineers from the various airlines. This committee, known as the Airlines Electronic Engineering Committee (AEEC) of Aeronautical Radio, Inc. (ARINC), has functioned with a high degree of success. In addition to pooling their talents in the solution of mutual problems, AEEC has produced a large number of industry-approved specifications which serve as guidance material to those manufacturers who wish to design equipment acceptable to the air carriers.

In the meantime, the management of the Wilcox Company believed that size, weight, and compatibility problems that were considered severe from the standpoint of propeller-driven aircraft would be completely intolerable when viewed in the light of turboprop and turbojet aircraft of the not-too-distant future. Their answer to these problems: the CANARI System.

The saving in weight and size is readily apparent when a minimum basic CANARI System is compared to a typical installation utilizing equipments now commonly employed. From *Figure 1* you can see that in addition to reducing the space requirement by more than one-half the comparable CANARI System weighs but one-third as much as its conventional counterpart. Approximately

200 pounds can be realized on the minimum basic CANARI System. But a typical airline-aircraft installation, where virtually all equipment is installed in duplicate, could conceivably save as much as 400 or 500 pounds by utilizing a dual CANARI System.

This extra payload potential, which can be used for additional passengers or extra fuel, is in addition to the space saving which should permit the installation of a full dual CANARI System in the area normally allocated for an unduplicated conventional system.

Also apparent in *Figure 1*, and photographically illustrated in *Figure 4*, is the method whereby the CANARI System is assembled on one custom-fitted shockmount which contains the only junction box necessary to the entire system. The junction box may be factory-wired so that the customer will receive an electronics package ready to mount in his airframe, which will require only simple connections to antennas, control panels, and power. Top of junction box serves as a mounting base for dual DC dynamotor, or optional 400-cycle AC power supply, either of which will furnish plate voltage for all the units in the system. Thus the system may be operated wholly from DC, or entirely from AC, or from a combination of the two, at the customer's option.

All the unit assemblies in the CANARI System are 7⅝ inches high. The width will vary as can be seen in *Figure 2;* the units all being in definite fractions of an ATR width which is 9¾ inches. Depth is uniform at 12½ inches to permit the integral junction box and system power supply to be mounted behind the units without exceeding the maximum over-all depth allowable under ATR specifications.

Another innovation apparent in the various illustrations is the use of perforated equipment covers throughout. This greatly improves convection air circulation, providing maximum cooling without going to forced air blowers in the radio rack. To further alleviate the heat problem a new type high-efficiency, heat-dissipating tube shield has been employed in conjunction with the ARINC ruggedized, airline-approved, miniature vacuum tubes. To protect relays and other components which may be sensitive to the small amounts of dust which will accumulate inside equipment covers between maintenance inspections, sealed-type components have been employed. The members of the CANARI family are:

Type 700B ILS Glideslope Receiver—20 crystal-controlled channels, ¼ ATR wide; weight: 6 pounds.

Type 701A Automatic Direction Finder (ADF) Receiver—high performance unit in a ½ ATR case; weight: 13 pounds.

Type 702A Marker Beacon Receiver—superheterodyne, crystal-controlled "three-light" receiver for 75 mc, in a ¼ ATR case; weight: 4½ pounds.

Type 704T High-Frequency Transmitter—10 crystal-controlled channels providing 50 watts power over the range 2 to 14 mc, in a ¾ ATR case; weight: 13 pounds.

Type 704R High-Frequency Receiver—20 crystal-controlled channels in the range 2 to 18 mc, in a ½ ATR case; weight: 10 pounds.

Type 704M Modulator—this modulator is used with the Type 704T HF Transmitter. It weighs 5½ pounds and is contained in a ¼ ATR case.

Type 705A VHF Communications Receiver—560 crystal-controlled channels providing coverage every 50 kc from 108.0 mc to 135.9 mc. It comes in a ⅜ ATR wide case and weighs 10 pounds.

Type 706A Navigation Receiver—in this unit the 705A Receiver is combined with essential phase and tone circuits to provide VOR and ILS functions in addition to communications coverage. It is housed in a ¾ ATR case and weighs 15 pounds. Provision is made for optional

(*Continued on page* 44)

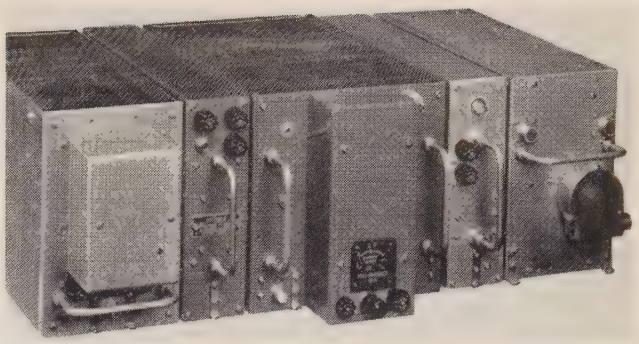


FIGURE 2—*The above is representative of the various sizes of the units which make up the CANARI System. They are (left to right) the 704R HF Receiver, the 704M Modulator, the 700B ILS Glideslope, and 710A Automatic Direction Finder Receiver*

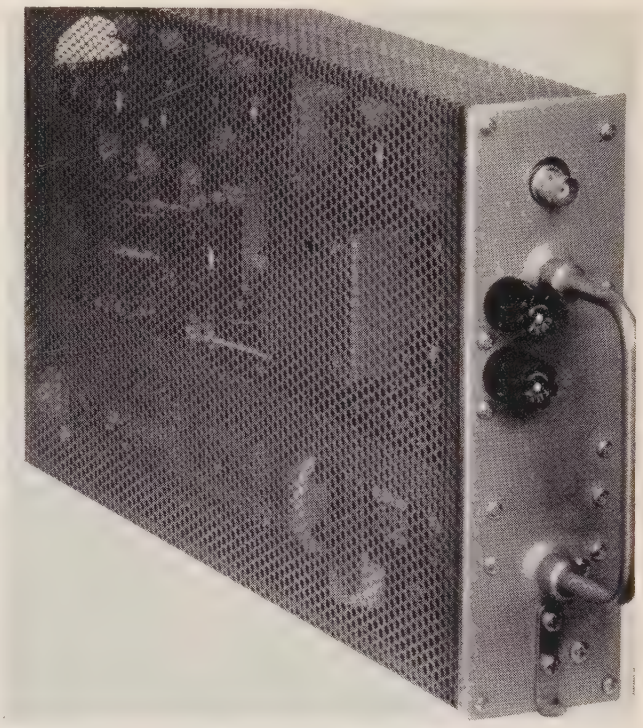


FIGURE 3—*The CANARI's Type 700B Glideslope Receiver offers 20 crystal-controlled channels. It is ½ ATR wide and weighs just six pounds. Depth of all units is uniform at 12½ inches to permit integral junction box, power supply to be mounted behind the units*

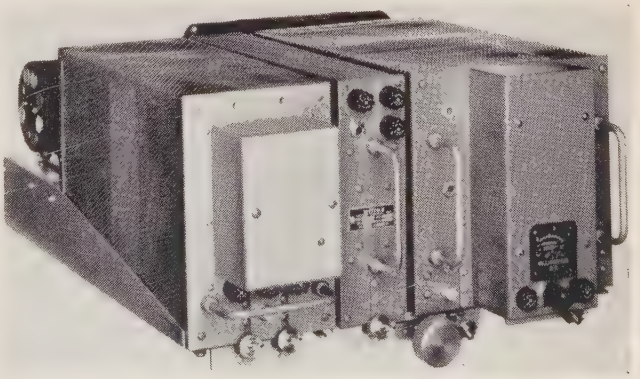


FIGURE 4—*The Type 704 HF communications unit consists of (left to right) the Type 704R Receiver, the Type 704M Modulator and the Type 704T Transmitter. CANARI System is assembled on one custom-fitted shockmount and contains only one junction box*

BUSINESS AIRCRAFT— Modern Magic Carpet

by Jean H. Dubuque

Executive Director,
National Business Aircraft Assn.

In this era of growing industrial decentralization, the hundreds of commercial organizations that shifted their plants or main offices to smaller communities were faced with the problem of expediting business travel. To some 6,000 firms, owning aircraft already has proven to be the most logical and practical solution to this problem.

Let us briefly review the case of one sales executive whose home office was located in a small mid-western town. Whenever scheduled to make a fast, extended trip through the southern and southwestern sections of the country, the problem of transportation became critical. He couldn't afford the delay of traveling by car and train and the airlines didn't stop at most of the localities on his itinerary. Even the combination of car, train and airlines failed to reduce the length of non-productive traveling time. On such a perplexing occasion, he suddenly remembered that many companies were using airplanes for business travel. He solved his problem by renting a plane with pilot and was able to cover the far-spread territory in record time, also reporting a substantial saving in travel expense. He further found that utilizing the airplane on this particular trip enhanced the prestige of his company, resulting in an increased volume of sales.

What was the eventual outcome of this case? The company bought a small plane, hired a pilot, and stepped up its sales program by extending operations into territory previously considered beyond the scope of profitable coverage. Official spokesmen proudly pointed out a spectacular rise in annual gross income as a direct result of owning and operating the plane. Since company salesmen were able to quickly reach potential and regular customers and bring them back to investigate the plant facilities if necessary, customer relations also were greatly improved.

No practical and progressive businessman can deny that expanded communications and swift transportation are invaluable assets to company operations. The fact that a vast private fleet of aircraft is winging over the nation's airlines day after day in behalf of business and industry, bears significant testimony to the speed, utility and economy of the business airplane.

Comprised of 21,500 aircraft of all sizes and types, it is the largest non-military fleet in the world. Statistics reveal that this civil air armada is 17 times larger than all the combined domestic airlines, provides more passenger seats, flies more hours and miles annually than the domestic scheduled air transports, and enjoys a financial rating that is literally astronomical.

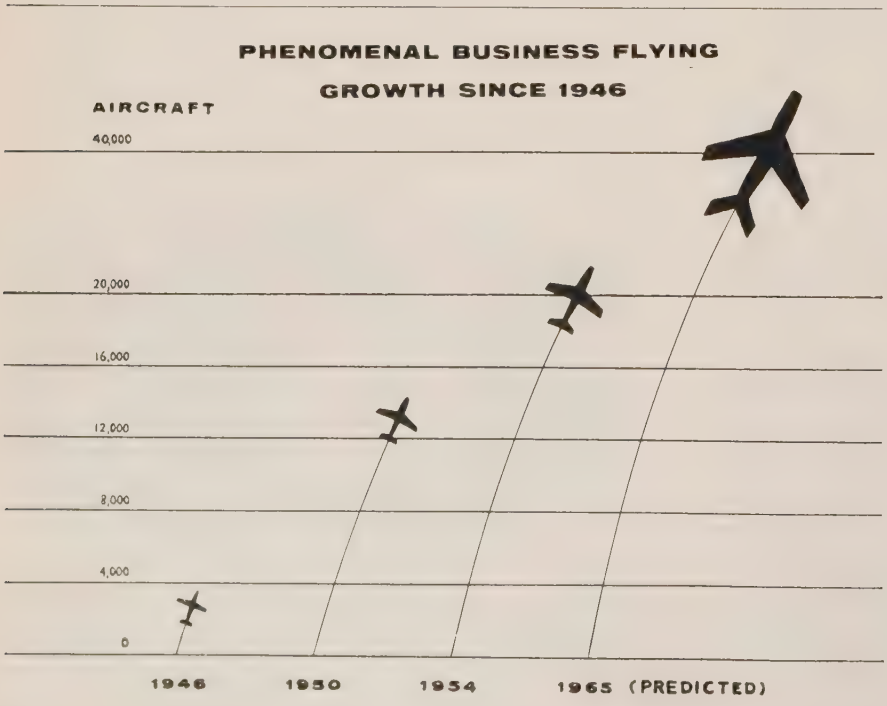
Yes, it is truly a phenomenal air fleet. And rightly so, since it is owned and operated by an aggressive competitive group that has made this nation the world's mightiest industrial giant—The American Businessman.

How did this all come about? Why is the businessman taking to the air in rapidly increasing numbers? What is the future of business-aircraft use in American commerce? Let's take an illuminating look . . .

Business aircraft are a unique yet natural outgrowth of World War II. One of the most important and far-reaching lessons learned by the businessman during that trying period, was the flexibility, speed, and utility of the airplane for moving personnel and material over the globe to strengthen the sinews of our fighting forces.

He also found that his key employees could solve knotty production problems more speedily by being in person on the trouble spot. He was quick to note and prove that personal contact was easier, faster, and more practical when air travel was used. Despite the red tape of travel priorities, delays in schedules, airlines jammed with military personnel and VIP civilians, he leaned heavily on this transportation media during the crucial years of world conflict.

In the post-war period, our nation was faced with a greatly expanded production capacity and an uncertainty as to how it could best be converted to peacetime use. But our opti-



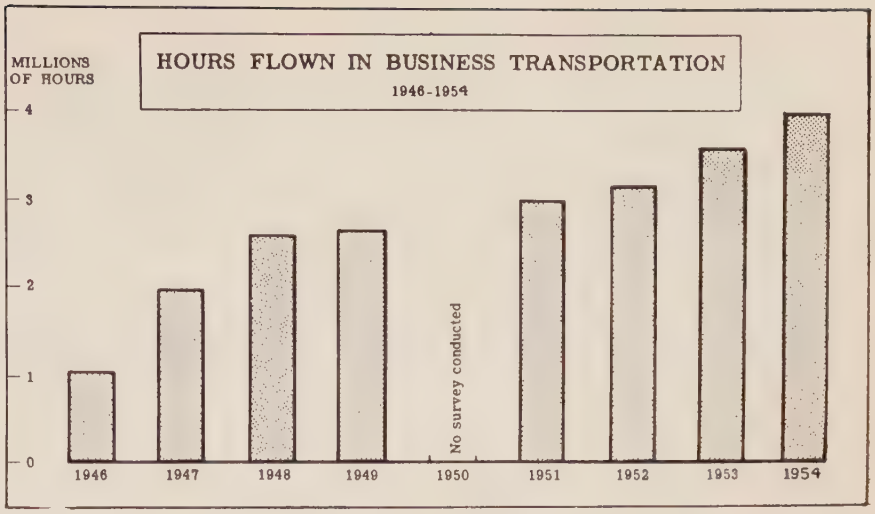
mistic American businessman believed he could do the job if neglected pre-war civilian markets were revived and new markets soundly established. Air transportation was the best answer! So he rolled up his sleeves and went to work. At first, the airlines bore the brunt of his growing demand for personal contact with former and potential customers scattered in all sections of the country.

Our businessman soon found that many of his promising new markets were in areas not served by the airlines. The airline industry, struggling to rebuild its war-crippled service, did not at the time provide schedules frequent enough or flexible enough to permit needed personal contact and reduce unproductive travel time. What could be done to meet this situation? A novel yet practical possibility was to have the company buy a war-surplus transport-type aircraft at virtually give-away prices and fly where they wanted to whenever they pleased! A number of the bolder and more progressive-minded companies decided to give it a try—so they bought their first business airplane, converted it to meet their requirements, hired a qualified pilot, and hoped for the best.

There is little need to justify the highly gratifying and almost startling results. The idea rapidly caught on. Business airplanes not only boosted efficiency and cut non-productive time but opened virtually unlimited means for maintaining close contact with old and new markets, speeding up inter-company relations, permitting top executives to move directly from point to point with minimum absence from the main office and more time to spend at home. Altogether, the business airplane assured far better over-all company management and started the gross income graph line moving steadily upward.

Since time is still the most important factor today to a business executive, each year thousands more are taking to the air in company-operated aircraft. Faced with increased competition, the necessity for compressing complex staff duties, contacts, conferences, field trips normally in an eight-hour period each day, he must necessarily make his time as productive as possible.

To beat the clock and make field trips pay greater dividends, officials of large and small organizations soon found that the modern answer for stepping up productive hours from two to four times depended upon direct air transportation. They also learned that users of surface transportation were losing some 50 to 60% of their business potential, were subject to more physical wear and tear, frustrating changes and delays in schedules, longer periods away from the office, and less time with the family.



Perhaps your company does not require extensive field trips. If so, this article may be of only minor interest. On the other hand, if you have high salaried executives sitting day after day in trains, driving autos over long distances, or combining these forms of transportation with airline schedules that do not go directly to the desired destination, then the case cited earlier should be of considerable interest and importance.

It may well prove a turning point in the future progress of your company and open new opportunities for personal achievement.

You may say, "Well, I am doing all right now, so why change?" As a businessman, you know that the productive hours of executive, sales and service personnel often determine success and failure. If you doubt the percentage of non-productive time spent in surface and airline travel, try keeping an accurate record for 30 days and compare the time actually lost in getting to and from your business destination with the time spent with your contact. You'll find the figures eye-opening and most educational.

The average business airplane used today by top executive and staff officials operates about 500 hours per year, or flies approximately 70,000 miles. This is over six times the miles driven or ridden in a comparable period in an automobile or train. The reason is relatively simple. You get where you want to go faster, oftener, more directly, and easier by air.

In 1954, the flying businessman spent 3,900,000 hours aloft and covered more than 546 million air-miles on trips of every type in every weather condition. Over 5 million officials and guest passengers traveled to all sections of the nations, day and night, with a safety record unparalleled in the history of non-commercial civil aviation. Such a vast flight operation, surprisingly, was not visualized by nation's expert aviation prognosticators during middle 40's following World War II.

At that time, all planning was aimed toward reviving personal flying. Enthusiasts envisioned backyard airfields with a small plane eventually

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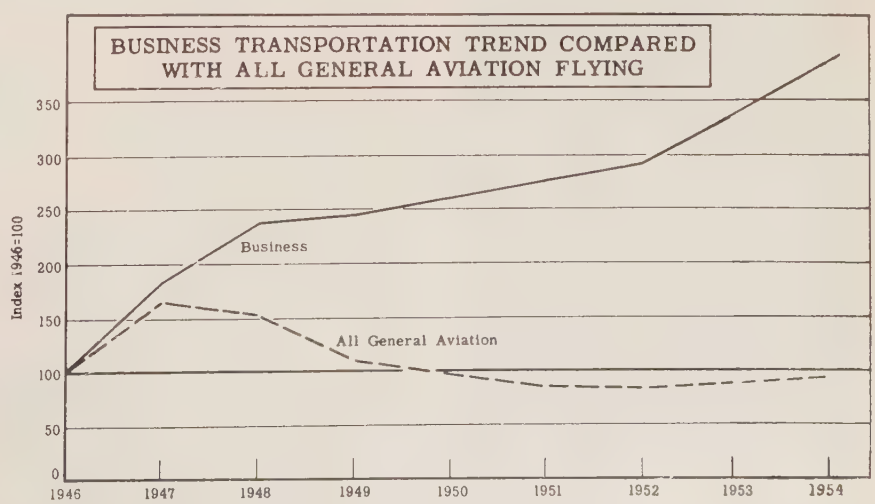


Cabin Temperature Control for Aero Commander

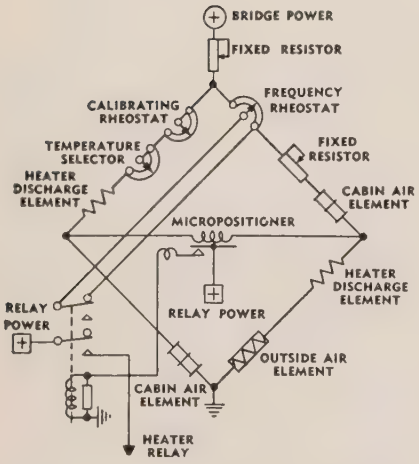


FIG. 1—*Schematic wiring of control circuit*

An automatic heater cycling control is now available to Aero *Commander* operators from Barber-Colman Company, Rockford, Illinois. The system maintains selected cabin temperature within plus or minus 2° F. and has been extensively tested in the company's own Model 520 *Commander* throughout a wide range of altitude and ambient temperature conditions.

The control is based on a temperature sensitive resistance bridge circuit using a Micropositioner, an ultra-sensitive polarized relay, as the bridge unbalance detector. The schematic circuit is shown in *Figure* 1. The relative resistance of the temperature-sensing elements located in the cabin exhaust air, heater discharge air, and outside air automatically cycles the heater ignition and the fuel solenoid in accordance with cabin heating requirements, outside air temperature variations, etc. Cabin temperature is selected on a rheostat located on a control panel above the copilot's seat (*see photo*). The panel also includes a switch to select automatic or manual operation and indicator lights to show when the heater is cycling and to warn the pilot of an overheat condition. Total weight of the components is approximately 3½ lbs. The system is designed to provide maximum safety features and is easily incorporated into the existing aircraft wiring. *Figure* 2 illustrates the location of the components in the aircraft.

Similar Barber-Colman automatic temperature controls have already been installed on most of the larger multi-engine business aircraft, *e.g.*, DC-3, *Lodestar*, PV-1, A-26, B-23, *Mallard*. Automatic temperature controls are available for aircraft using intensifier tube-mixing valve heating systems. Operators have been pleased with convenience and comfort of automatic temperature regulation and have reported hundreds of hours of trouble free operation.

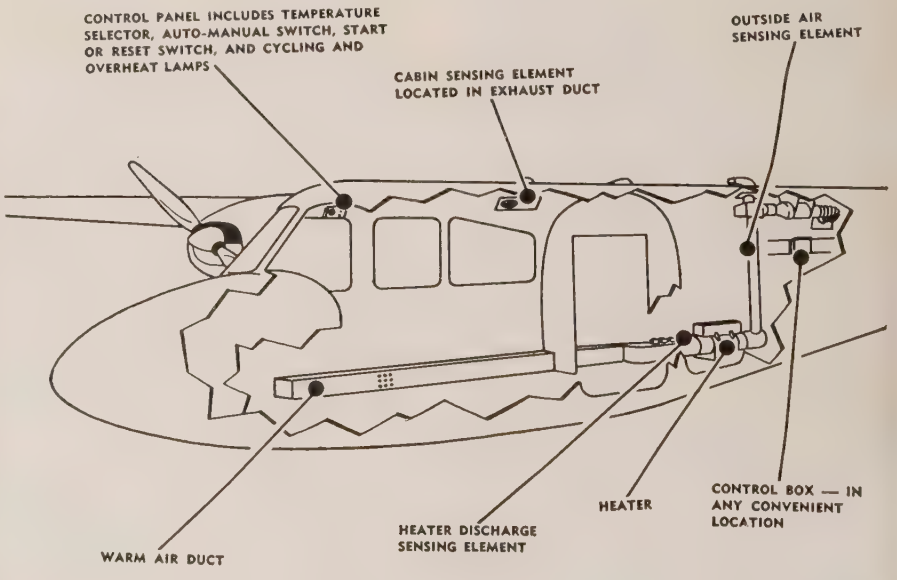
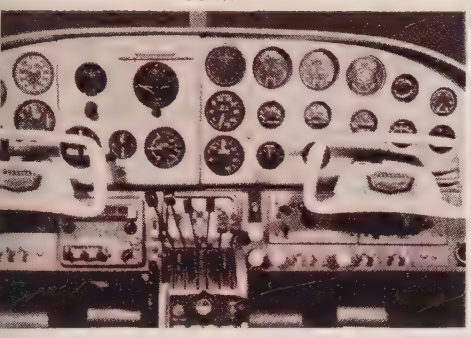


FIG. 2—*Drawing shows location of automatic control components in Aero Commander*

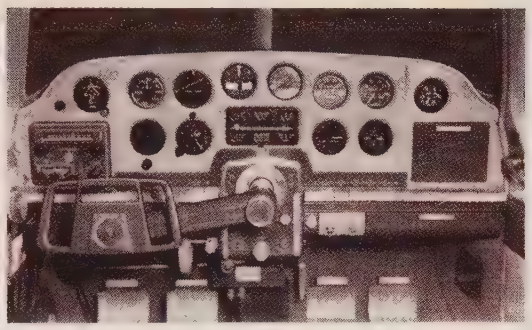
HEATER *control is above the copilot's seat*

More LEAR VHF radio is being installed than all other makes combined

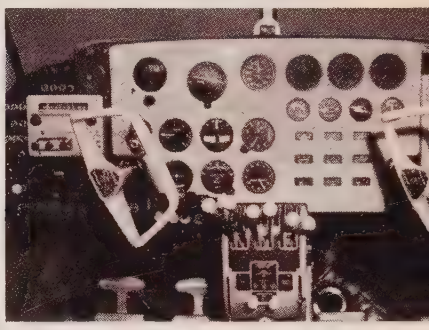
CESSNA



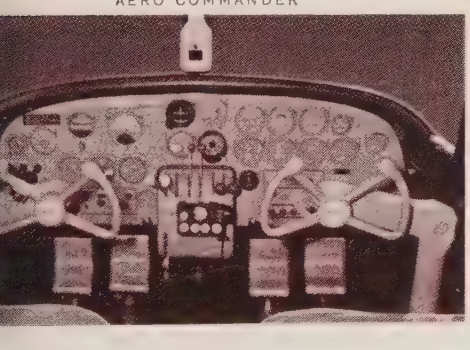
BEECH



PIPER

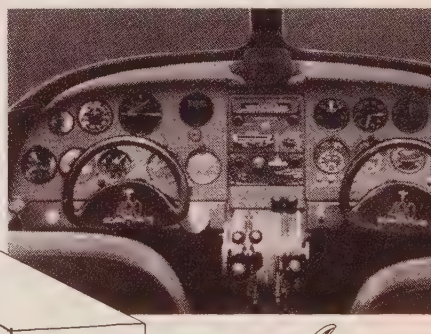


AERO COMMANDER

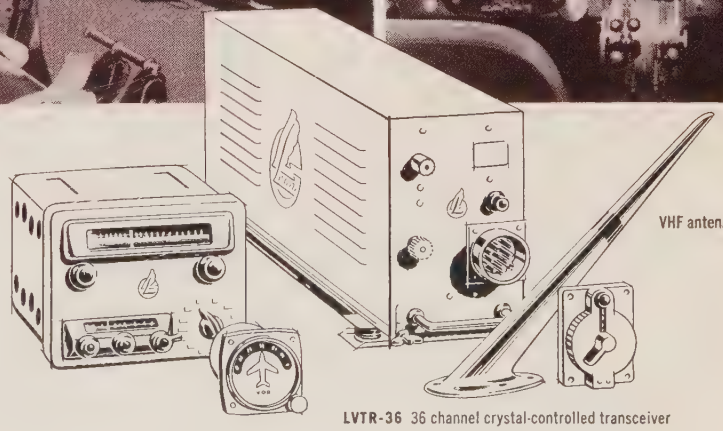


BELL

CAMAIR



LTRA-6 VHF transceiver, OmniMeter, LF receiver



VHF antenna

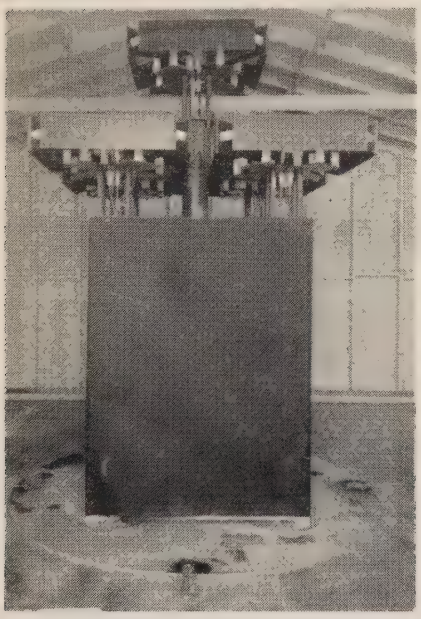
LVTR-36 36 channel crystal-controlled transceiver

LEAR LEARCAL DIVISION • 3171 South Bundy Drive, Santa Monica, California

by Randall H. Carpenter

Mgr., Air Transport Div., Flight Safety Foundation

Two Pilots' Controlled Air Traffic



USKON *cloth surrounds VOR antenna pedestal to mask out spurious radiations*

In order that we may reduce and eventually eliminate the hazard of mid-air collision, it is necessary that decisive and immediate action be taken. The present method of intermixing IFR/VFR traffic on our airways, particularly in high-density areas, is a dangerous situation. Under a variety of circumstances it is quite possible that with today's existing flight rules an aircraft operating VFR may fly into the path of another aircraft operating IFR, under conditions of visibility that make a collision unavoidable, and yet each aircraft is completely legal under its separate set of rules.

In 1948 CAA/ATC Centers handled about 8½ million IFR flights. By 1953 this figure had jumped to more than 15 million. It is well known that the majority of all flights are conducted under VFR flight rules and, therefore, these figures do not reflect the magnitude of actual operations. Understandably, the Centers are not able to handle this vast operation without entailing delays which are often considered unacceptable by the operator. Therefore, it is obviously impractical to talk in terms of controlled traffic throughout the *entire* United States. In many areas operations under the present VFR rules are safe and practicable. But on heavily traveled airways and in the high-density metropolitan areas this "double standard" constitutes a very definite hazard.

At several points in the United States, airways have been designated for use as "one-way" airways in instrument weather. This type of operation is well publicized so that all operators may be aware of the type of usage that exists in instrument weather. Curiously enough, it still remains possible for an aircraft to operate over one of these airways, maintaining proper VFR minima and at the same time be approaching an area from which instrument-cleared aircraft are utilizing *all* of the available altitudes. It's perfectly clear, then, that as an aircraft proceeds VFR into an area of deteriorating weather on one of these airways, the probability of collision is compounded. Another facet of the problem is shown in the use of airspace in the vicinity of the so-called uncontrolled airport. Where ILS or other approach equipment is installed, many corporate and private operators make instrument let-downs into these fields. On the other hand, local flights may be conducted on a "clear-of-clouds" basis in this same local airport area. This is consistent with VFR rules. At the same time it is quite possible for an aircraft operating IFR to make a normal instrument approach and yet meet a VFR aircraft face-to-face upon breaking out of the overcast at perhaps as low an altitude as 500 to 600 feet and in as short a time as 10 or 12 seconds after becoming visually contact.

Probably the most important element of this problem is the operation of aircraft in marginal VFR weather. The writer knows, from personal knowledge, of instances where small, single-engine aircraft have arrived in the New York terminal area and asked for landing instructions when only two or three miles from La Guardia Field. At the same time actual weather due to visibility restriction was such that air carriers were making instrument approaches, using ILS and such other facilities as were required. In one particular situation the aircraft had departed a New England city with the *reported* weather above VFR minimums along the entire route. The *forecast* weather for the La Guardia area, however, showed not only that the visibility could be expected to deteriorate to a point below VFR minimums but that very possibly instrument conditions would prevail by the time of arrival. In general, high-density traffic areas are also areas in which smoke and haze frequently present a problem to visual navigation. It is easy to understand how an aircraft can be caught in a situation such as this. However, it is difficult to justify continuing in this situation without receiving adequate traffic clearance, thus assuring separation and protection for *all* aircraft.

In another instance, the writer has personal knowledge of an aircraft from one of our midwestern cities that was operated VFR virtually daily throughout the entire winter. This particular pilot was and still is known to be rather proud of the fact that he has never required an instrument clearance. This, in spite of the fact that during this same period corporate and air-carrier aircraft were either making instrument approaches or were grounded because weather was below established minimums.

It is tragic, but perhaps in a way fortunate, that we know of another specific example of the dangers of attempting to operate VFR in marginal weather. From the official facts it seems clear that the accident that occurred near Cincinnati last winter involving an airliner and a privately owned twin-engine airplane was an open and shut case of an aircraft attempting to operate VFR when the simple request for a traffic clearance, had it been made 15 minutes sooner, could have prevented this tragedy.

Several corporate operators have conducted surveys on the relative value of operating between, or into, high-density areas VFR *vs.* IFR. Of those operators to whom the writer has talked, indications are that operation under instrument flight rules has been more efficient and has occasioned less delay than when operating VFR and encountering conditions that bring about a delay when a request for clearance is delayed to

(*Continued on page* 42)

by Gordon Edward

Executive Pilot

Opinions:—

VFR Flight

Your business pilot-correspondent has been following the growing controversy re: VFR vs high-density area congestion. Having been both a private and commercial pilot, and also active in traffic control and airline operations for 18 years, perhaps I have some insight into both sides of the question.

My indignation regarding this controversy stems from the extremes to which both sides seem to go in refusing to consider the merits of the other's case. On the one hand, I protest the prejudicial attitude displayed by some airline pilots who either never learned to fly the hard way but grew up to be professionals via the taxpayer-supported route of the service schools, or have forgotten their early struggles to gain experience.

On the other, I resent the presumption of the hysterical breast-beating proclamations of self-appointed watchdogs or interpreters for the non-professional class of pilots.

If we consider the obvious fact that the archaic 3-mile visibility and 1,000-foot ceiling standard of VFR of grandfather's day is no longer an adequate criteria for safe visual separation of today's airplanes, it becomes even more inadequate when we realize that visibility at flight levels over metropolitan and industrial areas is usually less than reported ground visibilities. Also, most terminal airports are surrounded by built-up areas often on higher terrain!

In fact, if the visibility observer had to make his measurement while hurtling along at over two miles per minute towards the so-called "clearly defined objects", he might find that he was literally on top of them before he recognized them. How much worse with a speck in the sky approaching at a rate of four miles per minute!

Champions of the common-man pilot often claim that there are no statistics to justify increasing the VFR standards. Do they mean that the hundreds of near-misses have not been catalogued and blame assigned? Or do they mean that we have not yet had tons of assorted metal parts spread out over some square miles of city streets? So much for the plea that nothing should be done until the Grim Reaper tallies a harvest.

What about the airline pilots, the "misrepresentatives" of whom are quoted as feeling there is no solution except reserving this troubled airspace for them alone? I've got news, fellows; you are your own worst enemies!

All the anti-collision devices in the world are not equal to a careful, watchful crew when flight conditions aloft permit the maximum use of their vigilance hampered as it is by ill-designed cockpit windows. And in lowered visibilities, even such vigilance may be futile. The same airline pilot who thinks nothing of slowing down his car on the highway when rain or other condition hampers his visibility, for some reason feels that any suggestion that he slow to approach speed once he enters a high-density area is an heretic notion born of the devil!

True, some steps have been taken. Years ago, when everybody flew DC-3's and Lockheeds, pilots used to accept a reduction to a 120 airspeed and maintain their respective positions to assist traffic control in establishing a reasonable sequence and separation on landing. Today? Today's traffic controllers tell me that any suggestion by them to the pilot of DC-6, -7, Connie or even Convair and Martin that they should maintain position behind some DC-3 or Lockheed cruising about 150 is met with moderate hysteria!

Has radar helped? In many ways, the ability of towermen to spot for pilots the respective positions of other and converging aircraft at night or in poor visibility has been a boon. However, even they cannot accept the responsibility for separation, especially from unidentified targets which may turn one way or another without warning. Additionally, they cannot advise as to the altitude of uncontrolled aircraft and hence could quickly destroy needed confidence by crying wolf for every target seen and eventually located thousands of feet above or below the aircraft being controlled.

Visibility aids such as Grimes rotating beacons have gone a long way toward attracting vital attention to the presence of unsuspected aircraft, but do little to resolve the confusion as to direction of flight. United Airlines has been experimenting with a condenser discharge system of flashing

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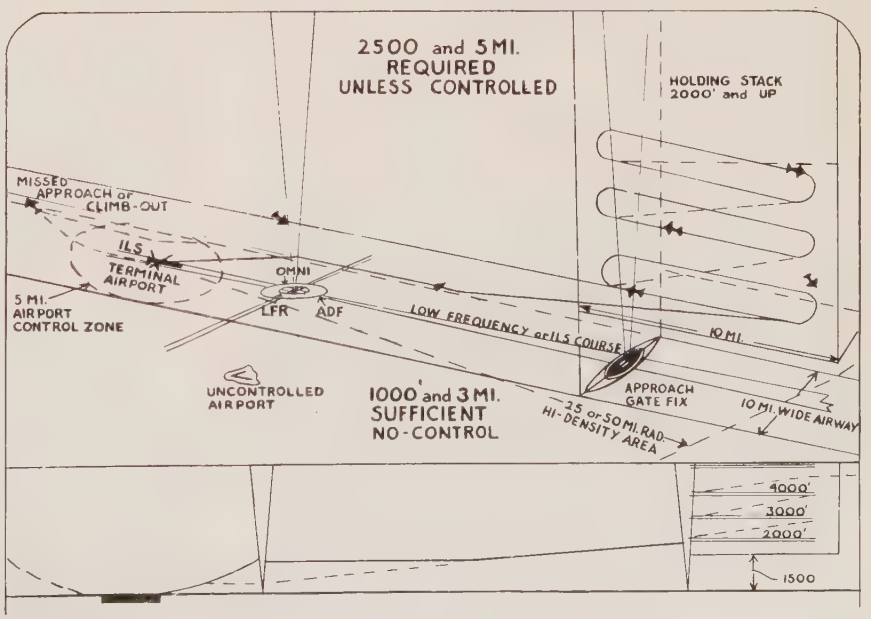
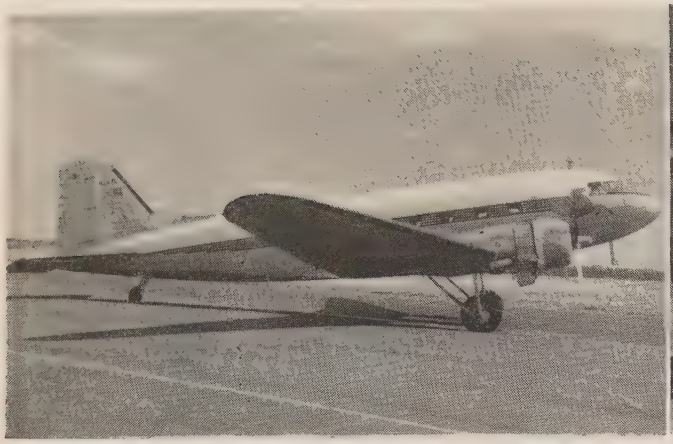
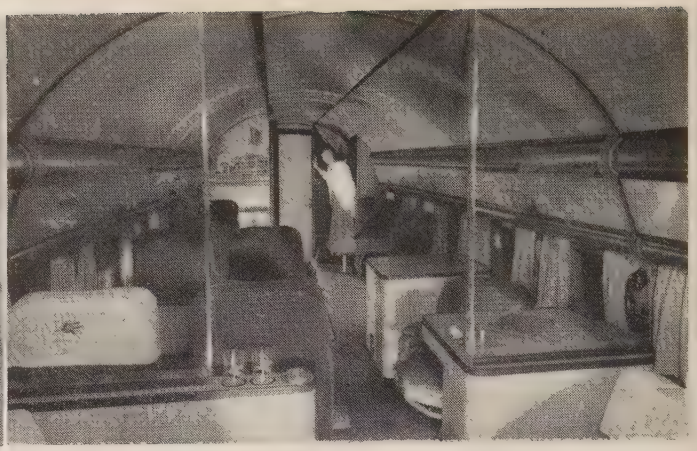


PROPOSED *re-designated Terminal Approach Zone with high-density area shows area restricted to controlled traffic when ceiling is under 2500 feet, visibility under 5 miles. Access is shown to uncontrolled airports and through the area with 1,000 feet and 3 miles. Requirements outside high-density area remain unchanged*



POPULAR *as a business plane, the venerable Douglas DC-3 costs about $1 a mile to operate if it is flown 1,000 hours or more a year, or five cents a mile for each of its approximately 20 passengers*



BUSINESS AIRCRAFT *like this Socony Mobil DC-3 used in long-haul operations offer the ultimate in comfort, bearing out the contention that personal comfort and business progress go hand in hand*

Can You Use a Business Plane?

by A. Paul Vance

Executive Pilot, Monsanto Co.

The white DC-3 circled the small, perilously located mountain-top airport, then touched down with veteran ease and skill to a smooth carrier-like landing, and two more business executives, with the aid of their company plane, had arrived easily, quickly and safely at Hot Springs, Virginia, for an important meeting of the National Business Advisory Council.

The plane hurriedly taxied over to the other planes clustered half-hidden in the deepening shade.

The DC-3's props slowed to a stop as the door opened forming a railed stairway to the ground. Two men with the immaculate grooming and purposeful manner of business executives, stepped off into a waiting limousine which, moments later, was sending a dusty plume spiraling down the mountainside.

Behind them, grouped on the mountain's top, was one of the largest arrays of big-business planes in our country. There were two slick-looking B-23's converted into flying offices, a sleek Lockheed *Lodestar*, a number of dressed-up DC-3's, a British made DeHavilland *Dove*, Twin-Beechcrafts, a Cessna 310 and an Aero *Commander*. There is really nothing unique about these planes, the men who fly in them, the pilots who guide them, nor their purpose and place in American business life. They are merely a segment of the rapidly growing fleet of American business planes. Their passengers, executives of our nation's leading business concerns, had slipped away momentarily from the rigors of company business to participate in an important National Business Advisory Council meeting.

Like many American businessmen called up to give valuable time to their government and community as well, they arrive for the conference in their own or a friend's company plane. They have found the personal or company plane to be the best way to maintain the rapid pace of present-day business, to fulfill their responsibilities as citizen-leaders and advisors and still to find time for their families. Only swift transportation can permit them to take full advantage of every fleeting minute, and this calls for private planes which can whisk them directly to and from such appointments in any corner of the country.

In 1953, 18,200 general aviation aircraft were engaged primarily in business transportation. Together these aircraft flew 3,104,000 hours or about the same number of revenue hours flown by the scheduled domestic and international airlines in 1953.

Such planes serve as an adjunct to scheduled air carriers serving the principal cities by bringing benefits of air service to doors of every community with an airport. The scheduled carriers have flung a thick network of inter-connecting routes over the United States, but they still provide service to one of every 10 recognized airports—about 600 out of 6,000 usable airport facilities.

Users of company planes force competition to use airline services if they have no planes of their own.

The business plane introduces many executives to aviation for the first time as it supplements the service of scheduled airlines and certainly offers no competition to the certified carriers. How business-plane travel has served to boost airline travel can best be shown by the example of a large company which presently is a leader in business flying. Since a short time after World War II, when the firm purchased its first plane, the scheduled airline travel of personnel of this company has jumped several hundred per cent. Much of this increase can be traced to the firm's expansion, of course. But how much of the expansion would have occurred in the areas where it did *if* it had not been possible to provide the good transportation service needed by management and operational personnel to put the business into motion? There is no doubt that business airplanes have been an important factor in assisting the spread of corporate activity to ever wider areas.

Important factors which influence the operation of company-owned aircraft are:

1. *Sales:* No other customer service has been found so important or directly instrumental to improving and cementing good relationships. With a company plane, it is possible to pick up the customer virtually at his door and transfer him wherever necessary to see the

operation or product in which he is interested. Several can travel as cheaply as one in a company-owned and operated plane. So a whole engineering or management team may be taken along, if desirable, on a particular mission. One large company, last year, closed a $5,000,000 contract by taking a team of the customer's engineers to see first-hand the manufacturing and testing of the products considered. Only a company plane enabled these men to reap the benefits of observing and conferring together while reaching an early and intelligent decision.

2. *Business Prestige:* An undeniably important factor in American business is also attached to aircraft ownership and can be an important sales tool.
3. *Emergencies:* Moving key personnel in times of crisis is so important that, as with other benefits, it is impossible to put a price on it. A number of companies which operate executive aircraft have been able to avert strikes by being capable of quickly bringing in labor negotiators by means of company planes. In other instances, oil companies have moved special fire fighters and equipment to special areas in order to stop the fire in a burning oil well.
4. *Reliability:* Having a service that can go when and where necessary is extremely important in the conduct of present-day business.
5. *Convenience:* A business plane can be scheduled to the convenience of business executives directly to or from a desired destination. Important meetings can be conducted as necessary and where adequate facilities and resources are available.
6. *Comfort:* It is well known in business that personal comfort and business progress go hand in hand. The business airplane used in long-haul operations offers the ultimate in personal comfort.
7. *Maximum Utilization of Skills:* A business plane, by making it possible to move the company's experts and specialists rapidly to any of its properties, eliminates the cost of duplicating such talent at each location. At the same time, it insures a maximum use of such highly priced talents.
8. *Time for the Family:* A great morale booster is provided to the busy executive when he occasionally finds it possible to enjoy the company of his family on a business trip over the week-end by use of a company plane. The demands on today's rapidly moving executive in keeping production lines moving, acquiring supplies and attending labor meetings, often leaves so little time for his family that a company airplane which permits him to have a little time with them is certainly a good morale booster, although little compensation for his having spent so much personal time in the interest of company affairs.

How does a company or corporation decide whether a business aircraft fits into its operation, and what type of plane is required?

This question has been asked by many business concerns who today are flying their own planes. It is being asked daily by many more. All that would seem necessary is to go out and buy any one of the number of fine planes available for such use, and this is essentially what is done.

However, there are several important steps to be taken and determinations to be made before any company, regardless of size or expense of operation, can choose intelligently the type of airplane which will satisfy its need for additional transportation.

It is generally agreed by all who sell or use business aircraft that the "savings of time" is the primary justification for operating a plane. The following are factors which should be weighed in order to choose the type of aircraft which offers, in each instance, the minimum cost per hour of time saved:

a. The probable users of the plane.
b. The estimated utilization of the plane, including passenger loads (a yearly passenger-per hour computation).
c. The actual expenses required to operate the plane under existing conditions.
d. The cost of airline fares for an equivalent distance, subtracted from "c" above to arrive at "cost of the time saved."
e. An analysis of time saved in relation to the number of passenger hours flown.

A comparision of the total time saved (converted to an income basis) against the expense involved for operating the plane will show whether the operation can be conducted profitably.

The type of aircraft to be used in a business operation depends primarily on the use it is expected to serve. A large company must examine its operations, plot the location of its plants and sales offices, and decide what might be termed the community of interest between its various facilities. After defining this community of interest, a survey of the transportation services currently offered should be conducted. Then a survey should be made of the type of personnel who commute between the company's various interests. Only after considering the costs and time involved as it relates to each individual and his relative importance to the company, can a true balance be struck to determine the economy of aircraft ownership.

In choosing the type of aircraft, it is necessary to know the distances between the various operations, and whether the service will be expected on a 24-hour basis, capable of operating even in the event of unfavorable weather. For long-range flights, for night operations and for all-weather flying, multi-engine airplanes capable of carrying adequate navigation and communications equipment generally are considered essential to maximum safety.

After studying such facts, it is necessary to weigh them against the economic factors involved.

The costs of operating a business aircraft depend a lot on the number of hours it is flown each year. Other influencing factors are the type of plane purchased and the amount of maintenance required. Operating conditions and even the location of the maintenance have a direct bearing on operating costs. The cost of aircraft operations is so varied, even on similar aircraft in the same company, that a specific figure or percentage is not too valuable. However, the following tabulation gives some indication of the operating costs of planes that are used in business flying: (*Continued on page* 60)

AERO COMMANDER *is becoming increasingly popular as "light-twin" for business flights. In first six months of 1955, some 35 new Commanders were sold to individuals and companies for business use*

The Executive Plane Interior

LUXURY *and comfort keynote this executive B-26 converted by AiResearch Aviation Service for Tennessee Gas Transmission Co.*

Today's corporate and private airplane must be a comfortable, efficient part of everyday living, with as much luxury as space and weight will afford. It must have a flexible arrangement, with last-word conveniences. Space permitting, it must have a desk, a bar and television, in that order. It must have chairs in which one can move about, turn and recline. And again, space permitting, those chairs must be berthable . . . convert with the least trouble into a good, rest-inducing bed. In short, today's executive, and those private individuals who can afford it, want a combination office, club, den and sleeping quarters on wings. What's more, they get it.

This is the day of decorator styling, and color harmony, murals, hide-away snack-bars, disappearing cigarette trays and other ingenious gadgets that are as important to the owner as the latest chart case, sun visors and foot rests are to his pilot. Even so, seating remains the number one interior interest. In the air or on the ground, man wants the most comfortable chair possible. As proof, we cite no lesser authority than Hardman Tool & Engineering Company of Los Angeles, designers and builders of aircraft seating for anything that flies.

Hardman has found that today's woman is a factor in both the interior planning and seat designing. The plane may belong to the executive's company, but the boss behind the boss has her say in what he and his staff shall consider a suitable flying environment. Her ideas may range from a penchant for copying the motif of the Cadillac Eldorado she drives, to the extremely practical consideration of restful surroundings and a seat which not only looks good but provides genuine relaxation. Airframe manufacturers, decorators, suppliers of interior trims and seat designers and builders are well aware of this influence. In fact, in the case of Hardman, eight years have been spent in research and development of luxurious chairs and complimentary trims for the corporate-type plane. Foresightedness dating from the old Ford tri-motor executive ship, has envisioned the day when the plane must simulate as nearly as possible the surroundings in which the passenger feels most comfortably at home. This has not been a solo undertaking, for Hardman has not only listened but encouraged the airframe manufacturer and converter to express the desires of himself and his customer. In effect, they invited a challenge.

TV SET, *individual tables, etc., are important features of this business DC-3 done by Executive Aircraft Service in Dallas, Tex.*

The manufacturer and his compatriot, the convertor, said: "Give us roomier seats for the same limited space. Give us subtle color harmony as rich as Ciro's in materials as practical as a cross-country bus. Give us berthable seats, reclining seats, chairs that make into comfortable beds. Give us swivel chairs with a clubby look, instead of stiff seats that face each other across a table like a booth in a drug store."

Every man and woman familiar with the more recent business airplanes, and certainly the private owner, knows that each of the foregoing request was provided satisfactorily. Molded Boltaron side paneling and related trim is provided in colors to match richly tailored fabrics which give beauty, ruggedness and luxury. Molded air-foam contoured seat and back cushioning with ear-type headrests and lumbar supports, and articulating seat bottoms provide the *feeling* of luxury. Or, if preferred, the ultra club-type chair is available and extremely adaptable. Where a maximum number of seats are desired, more underseat shin clearance has been afforded, and 45° reclining sleepable chair space is a standard feature. Such comfort has been developed in an over-all fore and aft spacing of 35 to 40 inches per chair. New type mounting, in the larger ships trackmounting similar to that used in the air-carriers, makes for more versatile utilization of space. But the big space achievement is in seemingly providing larger seats in a smaller over-all area. This is accomplished by making use of, and engineering the contour of the chair, to expand when even mere inches of room are available in relation to the configuration of the fuselage.

Hardware is made chiefly of aluminum and stainless steel. Convenience and practicability of maintenance are as much a part of these units as is appearance. Ash wells, tray attachments, brackets for leg rests, seat adjustment controls, and in some cases, coasters make up the usual

line of hardware on most seats, but custom hardware is frequently requested.

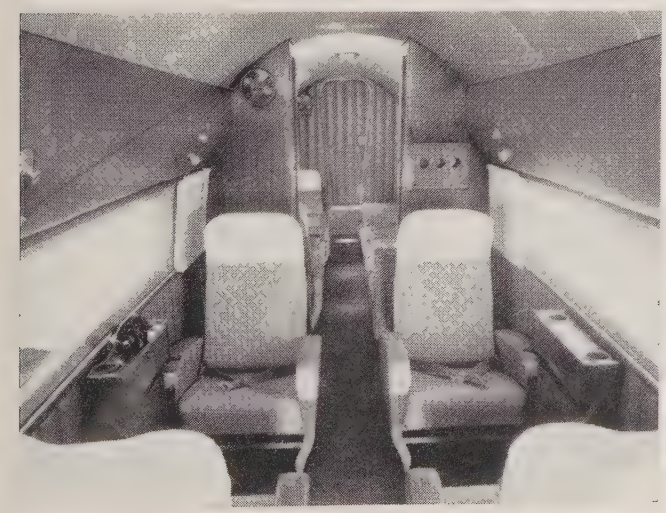
Of utmost importance in the development of these larger, more luxurious and more maneuverable seats is that they are pounds lighter than conventional seats, and the strength factor is greater than CAA requirements.

Other furnishings, as the size of the plane permits, include greater use of full-size divans, convenient placement of desks and fold-away tables, oft times a bar in varying sizes and design, and many gadgets such as pivoting glass and decanter trays and magazine and book racks. Light fixtures, lamps, clocks and other accessories also are given special treatment. And, as mentioned before, some planes carry built-in television which has proven practical in every way.

Inasmuch as the interior of the corporate-type plane is in nearly all cases custom-designed, an average cost is is hard to establish. In a number of the planes, highly specialized soundproofing has added to the over-all price. Individual ideas regarding the lavishness or the conservativeness of trim, special furnishings and other appointments also make the interior investment difficult to pin to a representative figure. But extremely handsome interiors have been developed for the smaller-type executive planes, such as the *Learstar* and D18S Twin Beech, which a few years ago would have been called sensational. Hardman engineers have devoted much time and effort toward creating chairs for these planes which provide the ultimate in comfort and luxury for the space and weight allowed. In the larger executive planes, there seems to be no limit to what can be accomplished in interior design.

Among the outstanding of the executive interiors are Humble Oil Company's DC-3; United Airlines Convair 340 for their President, William Patterson; Pratt and Whitney's Convair 340; Arabian-American Oil Company's DC-6B; and the Convair 340 of The Texas Company. These ships are representative in that each demonstrates the advancement of interior design for corporate ships in the past year. But each is as individual as it is possible to make them. The only characteristics they share are the utmost in luxury and practicability.

The greatest advancement expected for the future is in the seating, first because of the absolute necessity for chairs, and second because there is still unused space which may be utilized. In looking ahead, Hardman has ready and marketable a completely revised line of executive seating covering the active range of corporate planes from the smallest through the multi-engine models.



LODESTAR *conversions offers air-traveling businessmen picture windows, reclining seats, couch that converts to comfortable bed*

BUSINESS *Convair 340 offers flying executives real club atmosphere with comfort of home. Seats are reclining; several swivel*

Special effort has gone into the lightweight field, especially in planes using single seat installations. In collaboration with Beech Aircraft Corporation of Wichita, a new version of the popular Beech single seat has been developed and is now ready for distribution. This model known as the 3050 is designed with the regular Beech leg configuration, but has been widened over all (both seat cushion and arm rests) to offer a great deal more sitting room. This was done without changing existing floor fittings.

Design studies have also been made of other similar craft, and a number of variations of single seats are now ready which are adapted to use on practically any of the craft in the lightplane field.

In addition to chairs of the fixed type, Hardman also has developed narrow versions of its popular swivel chair. These, too, are ready for installation in lightplanes which, heretofore, have been denied the luxury of swivel chairs because of lack of space. Interest in the new swivel series has been gratifying, and much greater popularity is anticipated as more owners learn of the unprecedented development.

For the larger planes, in which space is no factor, standard swivel chairs, new wider and more plush swivels, and luxury line singles, doubles and berthables are available. Hardman now feels that it can supply the desires of all who make decisions on seat installation, be it manufacturer, converter, owner or decorator. Experience in creating limitless custom interiors is pointing the way to even more outstanding decor of the future.

Hardman emphasizes that in recognizing the growing importance of our national business fleet, even greater strides in the corporate airplane field will be forthcoming, and in rapid sequence. The company also feels that its present line is in full step with this progress.

Development, however, cannot be fully appreciated without considering the vast improvement in maintenance. In the first place, those areas receiving especially hard wear have brought into use materials which have proven rugged without sacrifice of beauty. Particularly is this true in Hardman's use of Boltaron, a plastic product simulating leather in a variety of colors. Boltaron is all but scuff-proof, and is used for side paneling and related trim, in many instances at the purchaser's request. The material is easily cleaned and maintains a fresh, new appearance after protracted use.

Hardware is another maintenance feature. Ash trays are of the convenient hide-away (drawer) type, or the more recent rolltop well type. In either case, the tray

(*Continued on page* 60)

SKYWAYS FLIGHT OPERATIONS ROUND TABLE

OCTOBER 1955 *Wings Club, New York*

Business Aircraft Maintenance

Moderator Hal P. Henning *(Technical Chief Pilot, General Motors Corp.):* "Gentlemen, welcome to SKYWAYS' Round Table discussion on business aircraft maintenance. The principal reason for engaging in maintenance is to acquire and maintain an acceptable degree of safety and an acceptable consistency of operation.

"Maintenance, as such, is not an end unto itself but rather is justifiable only as it is tailored to the characteristics of the individual operation, thereby becoming a tool or one of the tools which the operator uses to manufacture safe air transportation with maximum utilization and at a cost that is devoid of waste.

"Business-aircraft maintenance requires continuous hour-by-hour, day-by-day, week-by-week team work of the boss who is paying the bills, the flight crews, the mechanics, the aircraft and engine manufacturers, the parts vendors, the overhaul shops and service organizations, the hangar operators, the fuel and oil suppliers, the line-service crews, the airport operators and the Federal Government regulatory agency.

"Obviously, the scope of this subject is too vast to be completely covered in the time allotted us. Therefore, I think we should confine our discussion to three phases of this problem:

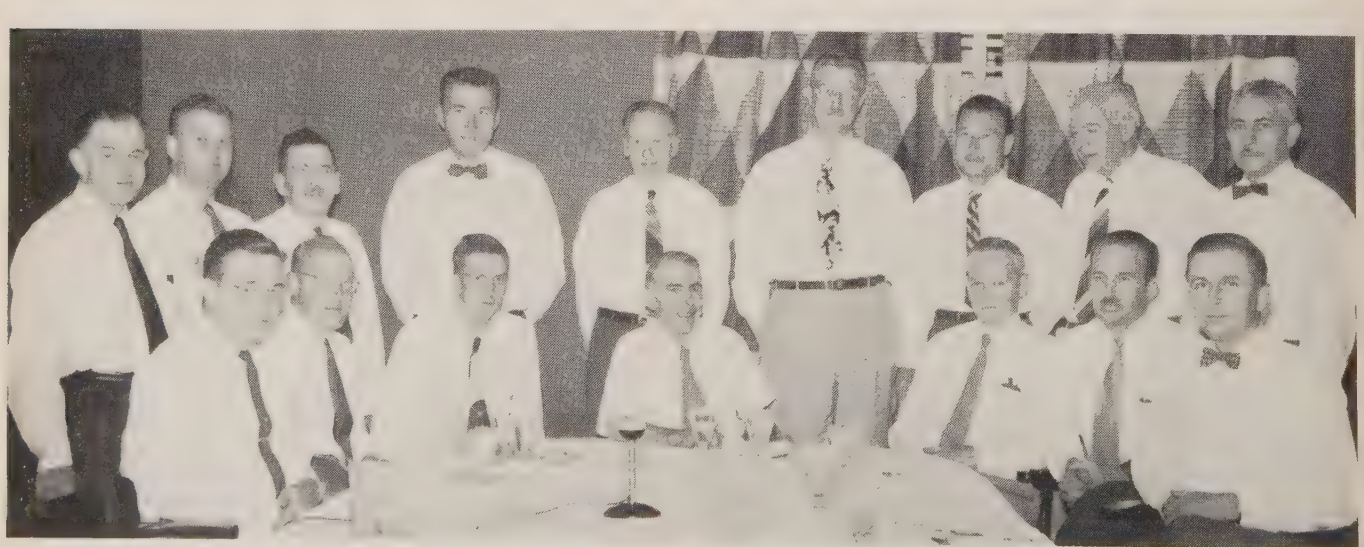
1. *The role of the pilot;*
2. *The role of the engine, airframe and component parts manufacturers and overhaul shops; and*
3. *The role of the CAA/CAB*

"Earle Bauer, would you lead off the discussion on the role of the pilot in this problem of business-aircraft maintenance?"

Earle W. Bauer *(Asst Mgr., Aviation, The Ohio Oil Co.):* "We feel that the pilot is an integral working part of our maintenance machinery. The pilot directly affects the efficiency, the quality and, of course, the economy of our maintenance operation. Wherever practicable, we require our crews to participate in all maintenance activities. Thus, they become more thoroughly familiar with the equipment, better versed in maintenance problems and are of greater assistance to our maintenance personnel in the accomplishment of the work. We feel this arrangement results in more comprehensive and more analytical squawk lists from pilots. Their analysis of many of the factors that can be checked in flight help a great deal in pinpointing the malfunctioning machinery. We also feel that by having the pilots work with maintenance, staying with it through the whole process and getting better acquainted with various phases of maintenance, we are assured of a more thorough type of inspection and, in many cases, an increase in quality of work.

"Our maintenance-wise pilot becomes a better pilot because he appreciates the value of good operating procedures in the handling of his equipment. Not to be overlooked is the excellent coordination and personal relationship between our flight and ground personnel.

"We find this system increases our preventive maintenance, but decreases corrective maintenance. We also have found that it increases the utility of our airplanes because, thanks to a forewarning of maintenance prob-



PARTICIPANTS *at Round Table discussion on business-aircraft maintenance were (left to right, standing) W. B. Little, CAB; Steve Brown, Continental Can; Joe Chase, FSF; Leonard Lee, Continental Can; Ted Stilwell, AiResearch; J. R. Salzman, GM; Earle Bauer, Ohio Oil; G. V. Dickerson, P&W; G. H. Weitz, CAA; (seated, left to right) F. E. Tobin, Texas Co.; J. D. Frazee, P&W; Ted Wild, Union Carbide; Hal Henning, GM, who served as moderator; R. E. Ellis, Esso; J. Lacey, Sinclair; T. Dickson, Airwork*

"**SINCLAIR** *pilots, copilots are responsible for maintenance," said Joe Lacey (center), "up to and including 100-hour inspection"*

"**DUPLICATE** *copies of squawk sheets are kept in log books," said Hal Henning (center), "along with a report of what's been done"*

lems, we can coordinate the scheduling of mechanical work on the airplanes with the heavier flight schedules. We like the system and we intend to continue it."

Hal Henning: *"Continental Can Co. is favored in its maintenance operation by having Leonard Lee as chief of maintenance and who doubles-in-brass by riding the line as copilot. In effect, he is the liaison between actual operating problems and the maintenance problems."*

Leonard Lee *(Chief of Maintenance, Continental Can Co.):* "The plan we have tried to follow throughout our operation is to have every copilot an experienced mechanic. We try to instill in them acceptance of the fact that they are the ones who are mainly responsible for the mechanical operation of the aircraft and are, in effect, our analyzers as well as copilots. Because we do have men of that calibre, we have been fortunate in getting accurate reports or analyses of whatever difficulties have been encountered in flight. However, we leave the final analysis to our maintenance men; they make the decisions as to what should be done in regard to taking care of the current squawks on the airplane."

Hal Henning: *"Leonard, do you have any organized program of indoctrination on equipment?"*

Leonard Lee: "Yes, every copilot is indoctrinated on the equipment he is going to fly. Usually, we try to promote men from within our organization, but if a man is hired from the outside, he is trained in the hangar as a mechanic so that by the time he goes on the road he has a thorough knowledge of that equipment and can be of valuable assistance to any service organization that may do maintenance work on the airplane when it is away from home. He also will be of valuable help to the pilot in analyzing any troubles that may be encountered."

Hal Henning: *"Joe Lacey, will you give us a run-down on both the pilot's and the operator's angle in this particular problem?"*

Joe Lacey *(N.Y. Supervisor, Aviation, Sinclair Refining):* "If anything, Sinclair goes a little beyond Ohio Oil's system. Our pilots and copilots are responsible for the maintenance of our aircraft up to and including 100-hour inspections. We feel the flight crew should know maintenance so that if and when trouble develops the boys are able to analyze it and know what it is instead of being afraid of it. We find that makes our over-all operation not only safer but better, service-wise.

"In trips around the U.S., the flight crew has access to good maintenance facilities only in certain places; in some places it isn't available at all. Therefore, each man in our organization, the pilot and copilot, has an A&E certificate or the equivalent in service. As a pilot, I wouldn't want to be without the experience I've had in maintaining airplanes."

Hal Henning: *"So far, we seem to have a unanimity of opinion. Bob Ellis, what are your thoughts on this dual role of the pilot and what effects it may have on his competency?"*

Robert E. Ellis *(Asst Mgr., Aviation, Esso Shipping Co.):* "Our operation might be called a little to one side of the ideas expressed thus far. In the first place, we require all of our pilots to have ATR certificates; we do not require them to have A&E tickets. We employ competent pilots and we feel they know something about the equipment they are going to fly. Our pilots are flying 60 to 70 hours a month, and we don't think they should be required to be mechanics after they finish their flights. If there has been any mechanical difficulty, they report to the maintenance group.

"We carry a third member of the crew, a flight mechanic, on some of our aircraft based at Newark. His main job is maintenance of the powerplant."

Hal Henning: *"That illustrates a difference in the type of operation and brings us back to the original contention that maintenance has to be tailored to the characteristics of an individual operation. What is good for one is not necessarily good for another.*

"Ted Wild can give us an interesting insight as to what a maintenance man thinks the role of the pilot should be."

Ted Wild *(Superintendent of Maintenance, Union Carbide & Carbon Corp.):* "Regardless of what airplane we are using, we operate with a three-man crew, but we vary in one respect from the usual operation in that both pilots are full captains. We do not have copilots. The third man is the flight engineer, or flight mechanic. He is an A&E who has been indoctrinated in the operation of our airplanes.

"In the case of our Convair, all the crews have been indoctrinated by factory personnel on the operation and basic systems of that airplane.

"As far as trouble-shooting is concerned, I believe the pilot is better qualified to handle the situation. We operate in a manner similar to an airline in that the pilot handles power on the take-off, then the flight engineer takes over and handles power reductions. He handles everything except pressurization. In emergency procedures, the flight engineer does all the clean-up at the pilot's command so that the pilot does not have to concern himself with it. The pilot flies the airplane and the copilot takes care of communications.

"Maintenance-wise, we have 25, 50, and 100-hour checks, and all inspections and repairs are recorded so that the mechanics can sequence the maintenance operations. All they have to do is look at the sheet and note the

*"**OHIO's** crews are established with specific pieces of equipment," said E. Bauer*

*"**OUR** plan," reported L. Lee (right), **"is to have each copilot a trained mechanic"***

*"**CONTINENTAL** feels that its pilot's job is to fly, not be a mechanic," said Steve Brown*

areas that haven't been inspected.

"This system was initiated because we operate three shifts, seven days a week. The hangar never closes down, and this system eases things through the shift turnovers."

Hal Henning: *"Before we go on to our second category, are there any other comments you might care to make concerning this role of the pilot in business-aircraft maintenance?"*

Frank E. Tobin *(Asst Mgr., Engrg, Aviation Div, The Texas Co.):* "Effective trouble-shooting on the part of the pilot stems from log book entries wherein the factors related to a malfunctioning are set forth and the corrective action on the part of the mechanic are clearly stated.

"Because aircraft-operating efficiency stems from service experience, the corporations operating the airline-type aircraft might find it to their advantage to keep abreast of airline techniques."

Ted Wild: "We keep a three-sheet log book, one original and two carbons. All the pilot must do to know exactly how things stand maintenance-wise is read the history of the previous trip to see what has been written up as a squawk by any other crew member. It's very helpful in our setup because the same crew does not remain with each airplane."

Hal Henning: *"It's very important that the pilot be advised of what corrective action has been taken. If he*

(Continued on page 48)

ROUND TABLE PARTICIPANTS

HAL HENNING, moderator of the meeting, is Technical Chief Pilot, GM. He has been active pilot since 1925 and is member of IAS, SAE, Wings Club, Aero Club of Mich.

FRANK E. TOBIN has been directly associated with aircraft maintenance for past 27 years, the last 15 with The Texas Co. He also is a former CAA Inspector.

JOHN FRAZEE has been doing technical liaison work between field service and enginering for Pratt & Whitney for the past 11 years. He joined P&W in March, 1940.

GEORGE H. WEITZ has been active in aviation since 1926, and operated a maintenance business for 9 years before joining CAA in '40. He is a Lt. Col., USMC-Res.

ROBERT E. ELLIS, Assistant Manager, Aviation Dept., Esso Shipping Co., held an active pilot's license from 1917 to 1940. He is a graduate aeronautical engineer.

GEORGE V. DICKERSON, Chief Inspector of Pratt & Whitney's Overhaul Shop, is a graduate of Trinity College and RPI; his aviation career has been in assembly, test

LEONARD LEE recently completed 10 years with Continental Can Co. as Chief of Maintenance, Air Transport Dept. He holds an A&E and Com'l ticket; is DAMI, DMR.

JOSEPH LACEY joined Sinclair Refining in 1946; became N. Y. Supervisor in 1951. He holds a Commercial ticket; is licensed A&E; has flown 680,000 miles for Sinclair.

J. R. SALZMAN, Superintendent of Maintenance, GMATS, became a licensed pilot in 1918. He joined GM in 1942; then served from 1946 to '51 as an aircraft consultant.

W. B. LITTLE has been active in aviation since 1923. He has held his present position with the Bureau of Safety Regulation, Civil Aeronautics Board, since 1948.

T. J. STILWELL. Hangar Superintendent, AiResearch Aviation Service, has been associated with aviation since 1933. He joined AiResearch, Los Angeles, in 1946.

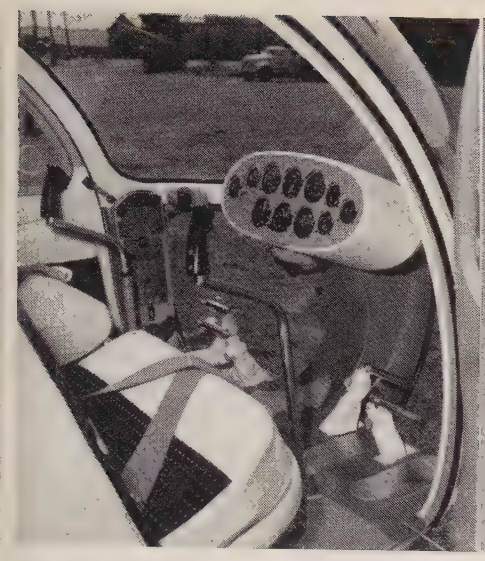
EARLE W. BAUER, assistant manager of aviation, Ohio Oil Co., joined Ohio Oil in 1945. He was an Air Force pilot during World War II.

TOM DICKSON, JR., Vice President in charge of Operations, Airwork Corp., was an Air Force officer during World War II. He joined Airwork after the war.

TED WILD, Supeintendent of Maintenance, Union Carbide, joined that company in 1953 after working as Plant Manager for Central Aviation, MacArthur Field, N. Y.

STEVE BROWN, Chief Pilot for Continental Can Co., set up its aviation department after World War II. His company operates a fleet of five aircraft based in N. J.

JOE CHASE has been active in aviation since 1929. He spent 12 years with UAL, was with CAA and, before joining FSF, was Mgr., Aviation Dept., Kemper Insurance Co.



CABIN *of the RMC heli-taxi is upholstered in matching leather and fabric*

EXECUTIVE COPTER, *a Bell 47H-1 recently purchased by Radio Materials Corp., now operates daily shuttle trips of 130 miles between RMC's Chicago plant and plant in Attica, Indiana*

Interplant Travel by Copter

A victim of growing pains, Radio Materials Corporation of Chicago is simply rising above its transportation problems on the rotary wings of the company's new executive Bell helicopter, the model 47H-1.

Founded in 1947, RMC has steadily grown in size and stature to the point where practically every electronic manufacturer in the U.S. and Canada uses its products. Under the energetic management of Board Chairman Joseph F. Riley and President Richard Bourgerie, orders for RMC ceramic capacitors piled up. (In five-year-period net worth expanded from $85,500 in 1950 to $1,500,000 this June.) Last year demand dictated the construction of a new 50,000 square-foot manufacturing plant at Attica, Ind., 130 miles away, to relieve the congestion at the firm's two Chicago facilities.

However, like so many other manufacturers are discovering, the addition of a new plant some distance away from the existing plants causes a serious administrative dislocation problem. As production swelled, more and more coordinating trips were required of top executives between plants, and the working hours lost by interplant travel became staggering.

RMC's two fixed-wing aircraft helped reduce the time consumed traveling the 130 air miles between plants, but not enough. Faced with the ironical situation of spending more time traveling by car between the airports and plants than was required to fly between the cities in which the plants are located, Radio Materials turned to the Model 47H-1 Bell helicopter as a speedy solution.

"Not only can we make interplant trips faster," Riley said, "but more important we can make them when we want to regardless of the weather."

Corporate offices are located in the northwest section of Chicago and the research center nearby, while the Attica, Ind., plant is 130 miles to the south southeast as the helicopter flies. RMC's two airplanes make the trip in 40 to 60 minutes, but plant-to-airport ground transportation in Chicago and from the Danville (Ill.) Airport to the Attica plant each take one hour. This adds up to 160 minutes one way, or more than five hours for a round trip.

Taking off from RMC's rooftop heliport at the home office, the Bell helicopter makes the direct door-to-door trip between the plants in 90 minutes each way, for a round trip savings of two hours per passenger. The Indiana heliport is literally at the Attica plant's front door.

Conservatively figuring at least one round trip daily, Riley estimates that a minimum of eight hours (one working day) per passenger will be saved every week by using the Bell helicopter instead of either company airplane. And when the hours belong to top management or highly skilled employees, the helicopter operation will add up to an annual windfall of more than 800 salvaged working hours (based on two passengers for just the minimum number of trips per year.)

Capable of operating "when even the ducks are walking," the three-place helicopter enables RMC officials to go when business dictates, "not the weather" which can cripple flight operations for days in the windy city of Chicago.

RMC's *Tri-Pacer* and *Apache* will continue to see heavy duty for group trips, but here again the Bell helicopter will be of service to complement the firm's aerial operations by providing quick transportation between the plant and the airport.

Beginning the first of September, out of town customers also began benefiting from the fast service possible only with the helicopter.

"We are finding that just the possibility of a helicopter trip is creating an unexpected sales appeal to potential and existing customers," Riley remarked. "So you might say the Bell helicopter is a valuable addition to our sales force, besides," he added, "serving as a vital administrative tool."

Externally decked out in the company's attractive colors of international orange and white, an interior of black with white pinpoint upholstered nylon and white leather trim, RMC's Bell helicopter is a distinctive, eye-catching calling card wherever it goes.

George C. Snyder, with 28 years of flying experience, is the official company helicopter pilot, although both Board Chairman Riley and President Bourgerie hold commercial fixed wing and helicopter ratings.

Official NBAA Report

NATIONAL BUSINESS AIRCRAFT ASSOCIATION, INC.

(formerly Corporation Aircraft Owners Association)

National Business Aircraft Association, Inc. is a non-profit organization designed to promote the aviation interests of the member firms, to protect those interests from discriminating legislation by Federal, State or Municipal agencies, to enable business aircraft owners to be represented as a united front in all matters where organized action is necessary to bring about improvements in aircraft equipment and service, and to further the cause of safety and economy of operation. NBAA National Headquarters are located at 1701 K Street, N. W. Suite 204, Washington 6, D.C. Phone: National 8-0804.

Outline of Panel Subjects to Be Discussed at NBAA Meeting

The following is an outline of the panel subjects to be discussed at the NBAA's Eighth Annual Forum.

Thursday, October 6

Morning Session

Operations Panel

I *Business-Aircraft Operators Need Improved Airports and Facilities*

A. *For the Plane:* Review of the services and facilities needed by business aircraft operators in industrial communities, often located on off-airline routes. These include passenger gates for loading and unloading, adequate parking facilities, and need for ground equipment, *i.e.*, battery carts, deicing equipment, tow bars, air conditioners.

B. *For the Pilot:* Long waits at strange airports without necessary conveniences makes the business pilot's job irritating, difficult and tiring. Between flights he must rest, eat, check weather, see to servicing and resupply of food and beverages. Naturally, he will select the airport, sometimes miles off his route, which supplies needed and desired services and facilities. The word is passed along when the airport operator makes it easier for him to do his job.

C. *For the Passenger:* The only reason business airplanes are used is to serve company officials and guest passengers. It is of first priority to get them quickly on their way, either outbound or inbound, with maximum convenience and comfort. If a refueling stop is made, restroom facilities, communications, newspapers, snacks, etc., may be needed. Above all, fast and efficient servicing is required as well as prompt weather information. When reaching destination, gate service (if available), baggage handling, ready transportation, and *a cordial greeting* by the airport operator makes the difference between a bypass or return visit.

II *Pilot Proficiency*

A. *The Airlines:* Review of current methods employed by the airlines to keep pilots at high degree of proficiency: *1)* How accomplished, *2)* Advantages, and *3)* Continuity of training.

B. *Business-Aircraft Operator:* Review of current methods employed by business-aircraft operators to keep pilots at high degree of proficiency: *1)* Is a training program essential, and *2)* Advantages and disadvantages. Consideration will be given to new equipment, changes in instrument procedures, geographic differences in weather, classes of airports used, routes or areas covered, density of traffic, loads carried, emergencies.

C. *Methods of Training and Proficiency Checks:* Is training established to meet certain needs? Is checking best accomplished by exchanging ideas, comparing performance data against an acceptable standard, and defining the areas of needed practice and refresher? Should a training program cover those areas not covered in daily operations—such as all emergency procedures? Given an airworthy airplane, the safety of any flight is a direct function of the pilot, his familiarity with the performance characteristics of his equipment, and his ability to forecast the operating conditions for his flight. Is he capable of handling his equipment under all conditions encountered?

III *Exchanging Useful Information*

A. *Report from National Headquarters:* Means of collecting, disseminating and exchanging information of interest to membership. Methods of publication, distribution, type of material, sources. This includes technical, safety, general, and membership news and special reports.

B. *Getting Information to Those Who Use It:* Why necessary information is worthless unless delivered to the one who can use it to best advantage. The business pilot must keep well informed on operational, safety and maintenance matters. For example, consider the value of pilot reports (PIREPS) of enroute weather. Should the pilot who is 10-15 minutes behind you have to wonder about icing conditions, wind conditions, turbulence at your altitude and position? Whether a business, airline, military, or private pilot, such a report may save time, property, and lives. Some areas to be considered for exchange of information are incident reports of 1) Near misses, 2) Traffic violations—actual or alleged, and 3) Unsafe operations. Others: 1) Accident reports, 2) Maintenance reports, and 3) Safety hints.

Afternoon Session

Maintenance Panels

I *Maintenance of Today's Aircraft*

Review of Maintenance methods and procedures as follows:

A. *Improved Service from Maintenance and Overhaul Bases.*
Some of the current problems faced by the business-aircraft operator: 1) Costs too high and above estimates, 2) down-time excessive and exceeds schedules, 3) need for maximum availability of equipment, 4) lack of engineering and maintenance information when work is done, 5) incomplete records of work accomplished, 6) delays due to parts availability or parts delivery, 7) lack of manpower to keep on job and get it done, 8) insuffient supervision of job.

B. *Maintenance and Overhaul Bases.* Some of the current problems faced at various maintenance and overhaul bases: 1) Balancing workload to keep stable working crew, 2) lack of specifications from the business-aircraft operator, 3) failure of business-aircraft operator to schedule work far enough in advance, 4) changes made after work has started, 5) aircraft not available in time for pre-inspection of job to facilitate ordering of parts, 6) too much personal supervision—and interference—by owner or operator of aircraft, and 7) cut-throat competition leading to unreasonable estimates just to get business.

C. *Improved Service from Aircraft and Component Suppliers*
1) *The Operator's View:* Review of some of the current problems facing the supplier: 1) Factory too busy with airline and military needs to fill business-aircraft operator's orders, 2) operator demands more service from equipment than it is designed to provide, 3) inability to maintain large inventory because of necessary capital investments, 4) difficulty in obtaining obsolete parts from original supplier, 5) high cost of scarce surplus parts.

D. *Keeping Business-Aircraft Operations Up-To-Date*
Review of changing operating conditions, aircraft modifications, weight control, performance, etc.: 1) Increased density of air traffic, 2) phasing-in pressurized equipment into traffic patterns, 3) turboprop and jet aircraft operations and effect on air traffic control, 4) increasing communications load, 5) adding more

radio and electronic equipment to offset air traffic delays, 6) increased aircraft weight and reduction of available cockpit space, 7) increased hazards in airspace because of varying speeds and wide range of equipment, 8) methods used to reduce or control weight increases, 9) desirability of more horsepower to offset weight increase, 10) changes in aircraft (such as rudder trim-tab modification) to take advantage of increased horspower, and 11) modifications to obtain more speed, better control, slick-up projects; examples: *Learstar*, Hyper DC-3, Super PV.

Are we fast approaching limits in 1) weight, 2) space, 3) electrical load, 4) cost, and 5) performance with present obsolete large multi-engine aircraft?

Are we ready to turn the page for a new airplane designed for business use with 300-mph plus speed, pressurization, tricycle gear, reversible propellers, long-range capabilities, and ample space for installation of modern communications, navigation, and safety devices?

Friday, October 7

Morning Session

Administration Panels

I *Administration of Business-Aircraft Operations*

Review of current methods and procedures used in scheduling flights and maintenance, aircraft operational policies, cost control, food services, etc.

Is it as important to schedule *down* as it is to schedule *up* time? How are crews—flight and maintenance—efficiently scheduled? What about the single or two-plane operator's administrative duties? Is the operations manual a useful administrative tool? Is cost control effective in eliminating waste and does it have a bearing on safety standards? What method is used to provide food for passengers?

General Comments: Some operators indicate that the *Operations Manual* helps to translate principles and company policies into practice in that it allows consistent, uniform-type operation regardless of fleet size or passengers carried, reduces or eliminates *executive pressure* and permits a pilot to understand limits of his job, and assures maintenance of general safety standards.

Some operators indicate that *Cost Control* does not compromise safety standards and reduces waste. Items to be considered for control include: 1) Tipping attendants although receiving poor service at airports, 2) excessive power from engines thus shortening useful life, increasing operational and overhaul costs, 3) adding new equipment before the equipment is needed or has been satisfactorily proven, 4) reducing deadhead flights and maintenance test flights, 5) less "fix-it" now maintenance and more preventative maintenance, 6) Better tooling to reduce manpower, and 7) improved scheduling of maintenance to allow advance procurement of parts before aircraft is out of service.

"Crystal Ball" Panels

I *Planning for Tomorrow's Business Flying*

Review of limitations of piston powerplants; ultimate use of turboprops, jet, atomic powerplants; the "new look" in business aircraft, etc. 1) How long will today's powerplants last? 2) What about continued availability of replacement parts and accessories? 3) Will the turboprop soon replace the piston powerplant? 4) How soon will a business airplane of new design be available? 5) When will jet or atomic powerplants be acceptable for business-aircraft use? 6) What about the future of VOR/DME in light of TACAN developments?

Afternoon Session

II *Planning for Tomorrow's Business Flying*

Review of value of the single-runway airport in industrial communities; expenditure of newly authorized Federal Airport funds for the benefit of smaller communities, particularly those of interest to the business flyer; the *Strato Port* as the answer to economical airport development and its possible revolutionary effect on civil and military flying; increasing joint use of civil airports by the military services and its effect on the future of civil aviation; plans for improved methods of air navigation and air traffic control; the future of VOR/DME in light of TACAN development and installation of ground facilities for its use in military aircraft.

Minimum Equipment Change Announced for IFR Flight

Effective August 1, 1956, all civil aircraft certificated for IFR operations must be equipped with an artificial horizon and a directional gyro, or equivalent (RMI). This represents an important change over previous requirements in the effect that it may have on the flight test for the instrument rating. Currently, a substantial portion of this examination must be accomplished on partial panel. With this requirement for full panels now in the regulations, it is conceivable that the CAA may permit the instrument rating flight test to be conducted with the use of all instruments.

Pratt & Whitney Offers Useful Fuel Information to D18S Users

NBAA-member Pratt & Whitney's R-985 and R-1340 Information Letter No. 2 contains much useful and interesting information regarding the effect of fuels of various ratings on the operation of the aforementioned engines. Following are examples:

"To be acceptable for use in an aircraft engine, fuels must have certain characteristics, among which two of the most important are knock rating and the tetraethyl lead content required to obtain this knock rating. The 80/87 octane fuel provides sufficient detonation margin with a minimum of tetraethyl lead in the fuel.

"If only fuels of 91/96 octane, or better, are available, they may be used with no change in engine ratings. When using them, however, it must be remembered that the lead content of these fuels generally is high enough to cause early evidence of excessive lead deposits."

Hurricane Protective Procedures Important to Business Aircraft

All business aircraft operators based at airports along the Atlantic or Gulf Coasts should have specific hurricane procedures established so that all personnel know in advance what preparations should be taken.

The major damage from any hurricane results from water flooding. The extent to which tidal waters will rise is difficult to predict since the flooding is a combination of high water and waves churned by the winds added to the normal high tide. Near the actual eye of the hurricane there is still another reason for high water. The reduced atmospheric pressure will cause a rise of from one to three feet provided there has been sufficient time for water to flow in from the outer edges of the storm. A reduced pressure over an entire lake would not cause a rise of water. There must be a pressure gradient over the water and an inflow to provide the rise.

AIRBORNE RADAR *is now part of the equipment installed in Forest Oil Company's Lockheed Lodestar shown here, prior to radar's installation, on the ramp at Butler Aviation, LaGuardia Airport, N. Y. Home base for Forest Oil's aircraft is Bradford, Pennsylvania*

FUELS-OILS

Features and Facts Pertinent to Successful Flight Operations

Things to Watch in the Refueling Picture

In aviation, as in everything else, the strength of any particular chain may be measured by the strength of the weakest individual link.

For many operators—but particularly for operators whose interests are centered primarily on the function of the plane in flight, and many a business-fleet owner falls in that category, the potentially weakest link in the chain of aircraft usage is the often taken-for-granted piece of hose that connects the plane to the pumps during that earthbound necessity of flight life, refueling. The businessman, for instance, who knows the number of engine hours logged in his executive craft better than he knows the number of his home telephone, may not have the vaguest idea of what sort of hose is keeping his plane alive or, for that matter, who is stamping, tramping, kinking or otherwise abusing this vital link in the maintenance chain. Only when a hose bursts while fueling *his* plane is the link clanked dramatically into focus and then it is far, far too late.

So that all operators of private aircraft, and fixed-base operators too, may have a better understanding of sound refueling hose practice and, consequently, a greater interest in tightening this vital link in the aircraft maintenance chain, Harry Knechtel, manager of hose sales and development for Hewitt-Robins, Inc., of Stamford, Conn., manufacturer of many airport and aircraft hose products, has compiled a solid list of 10 tips on the proper selection and care of aviation refueling hose.

By reading these tips, a more thorough understanding of the often-overlooked hose problem can be had and, by following the tips, just about all those problems easily will be solved and hose-failure dangers will be prevented.

1. First consideration should be given to the type of hose purchased. Hose should be specifically designed for *your* refueling operation, and should be approved by the airline and servicing operator involved. Collapsible-type hose should only be used on evacuation systems. Its lighter design will not withstand service abuse with the added weight of fuel within the hose. Conversely, semi-rigid hose types should never be used in a collapsible-hose system as they are designed to resist collapsing under suction and will be damaged by continual flattening.

Hose manufacturers recommend only those couplings that have been thoroughly tested and approved for their product. Make sure couplings are of an approved type and have been properly installed by competent personnel.

2. Make sure your refueling equipment is of the best design and in good condition. Desurging units and slow-closing nozzles are recommended to prevent excessive surge pressures. Recommended pump pressures and flow rates should never be exceeded.

3. Modern aviation refueling hose does not contain built-in static wire for electrical ground. Make sure aircraft and refueling truck are both grounded and the filling nozzle is grounded to the airplane wing before beginning fuel transfer.

4. You often see a flight crewman inspect his aircraft before entering the flight deck. Refueling crews also should visually inspect their equipment, including the refueling hose. They should be required to look the hose over carefully each day before its first use. An occasional glance at the hose during transfer may bring to light a defect not noted previously. Crews should be trained to immediately remove any hose that has been subjected to undue strain. Look for hose bulges in the hose body, proper coupling alignment, blisters, tears or gouges in the cover. Unnatural twisting or ballooning under pressure indicates a carcass weakness. *Check the nozzle screen for particles of the hose tube.* Look for soft spots immediately behind each coupling. Use only hose you know is in top condition. Test all refueling hose to 1½ times recommended maximum working pressure. Test should be conducted monthly for first six months of service, weekly thereafter.

5. Remove all sharp edges on refueling truck decks or pit installations. They can tear the hose cover and damage the hose reinforcement.

6. Before applying pressure to the hose, be sure all twists and kinks have been removed. Hose has less strength when twisted or kinked and, if weakened by past abuse, the hose may burst when pressure surges are registered.

7. When removing hose from storage reel, do not spin the reel at such a rate that the reel flutters against the hose at the reel connection. This damages the hose wall and will cause premature failure. Make sure the reel is operating properly and is of sufficient size to accommodate both hose length *and* I.D. size. Placing a shorter length of 2-inch hose on a reel designed for 1½-inch hose reduces bursting strength and decreases the built-in safety factor of the hose.

8. Be sure hose is not snagged on other servicing equipment or wedged between aircraft tires and apron. Hose must be free to move during pumping operation.

9. Use care when returning hose to storage after use. Carry the nozzle back with you. Do not pull full hose length and nozzle with reel motor or by hand from inlet connection.

10. Never store hose in kinked or twisted position. On top-deck refuelers with hinged wing ladders, be sure hose is not trapped at base of ladder, as the hose will be kinked and crushed when the ladder is folded down.

Synthetic Turbine Oils Called 'Engine Part'

As anyone concerned with its development or operation will testify or recognize, the advent of gas-turbine aircraft engine has meant more than a new way of power—it is virtually a new way of thinking.

An interesting, provocative summation of this new way of thinking has been provided in an announcement from the lubrication engineering section of Esso Standard Oil Co. Esso, of course, is the company whose synthetic Aviation Turbo Oil No. 35 is exclusively recommended by Rolls-Royce for use in its *Dart* turboprops as installed in the *Viscount* 700 Series.

Three significant changes in lube thinking are pointed to by company's engineers in analyzing turbine picture. "The oil is synthetic, consumption is negligible and oil is regarded as an integral, virtually 'sealed in' part of the engine."

The key to the toughness and virtual limitless longevity of the synthetic oils that turbines have caused to be developed is only in part due to the structure of the lubricant itself (a structure that can be tailored, chemically, to fit just about any engine demand so far envisioned). A vital part of the longevity lies in the design of the engine. The oil, for instance, in a turbine is not in contact with combustion gases as in piston engines.

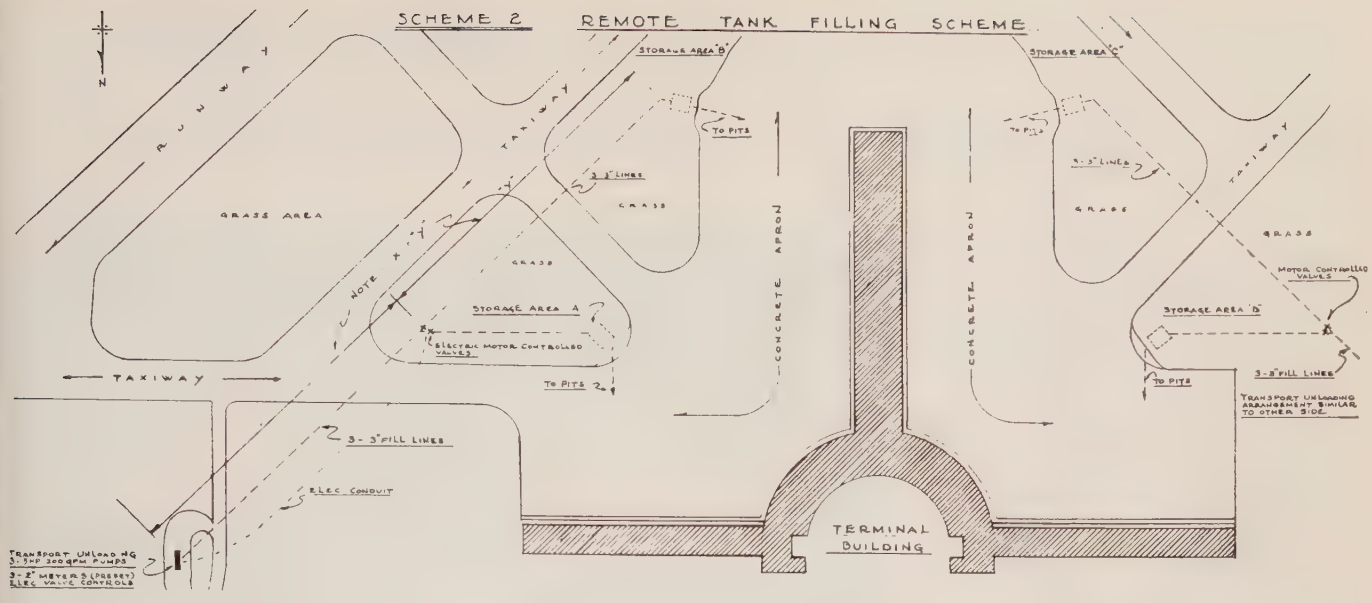
It is that factor that makes it practically sealed in, quite like the oil in the mechanism of a home refrigerator. Only at engine-overhaul time is the oil likely to be changed.

The gas turbine, furthermore, barely nibbles at its oil even when it does require replacement oil. A sixth of a pint per hour may turn the trick compared to a piston airliner's demand of, say, a gallon per hour. In ratio of percentage of fuel to oil this means turbine may use less than a tenth of a percent of oil to fuel. A piston engine may use one or two full percent.

Thus, the interesting new way of looking at turbine lubes: as an actual "part" of the powerplant itself.

Segregated Fueling Systems: Remote Tank Filling Scheme

(Because of the possibly increased interest in and emphasis on segregated airport fueling systems, as the demands of jet and turbine fueling become more and more complex, SKYWAYS, with the cooperation of the Aviation Technical Service of the American Petroleum Institute, is presenting a three-part survey of these systems. Last month's discussion was of a 16-gate airport system providing complete product segregation for from one to four petroleum supplies, all the way from storage tanks to airplanes. As in all systems to be discussed in this series, same total amount of storage is provided for—twelve



25,000-gallon underground tanks).

In not all instances will airport governing bodies permit direct transport deliveries of fuel to storage areas arranged around the airport in manner shown in last month's discussion. System diagrammed is an alternate tank-filling plan devised by American Petroleum Institute's experts for use when such restrictions are imposed.

This alternate system involves remote filling of the storage-area tanks from two separate transport unloading areas, using 3-inch fill lines and 5-hp, 200 gallon-per-minute unloading pumps.

Remote-control valves are provided for, to direct the unloading fuel products into the correct storage tanks.

Despite remote-fueling features, cost of this system, as estimated by engineering departments of petroleum companies, runs no more than 3% higher than basic system described in SKYWAYS last month.

Petroleum engineering departments also were asked to estimate cost of this system as compared to equivalent schemes in which products are commingled. Estimates turned in showed that this remote-filling system would run between 96 and 98.5% of the cost of commingling system.

Even if entirely separate fill lines are run to storage areas (rather than using the electric-motor-controlled valves and common lines for the first 650 feet), this segregated system, it is estimated, would still remain cheaper than commingling system.

Above and beyond the cost, of course, is the fact that for many operators, faced with the rapidly developing complexities of jet and turbine fuel demands, commingling systems are faced with obsolescence.

Reason for this is the highly competitive and highly diversified jet-turbine fuel supply situation with no prospect of complete standardization anywhere in sight as yet.

Fortunately, as this SKYWAYS series on segregated systems shows, the impetus to study segregated systems may actually result in future cost savings and may answer the standing objections of many suppliers to having their fuels dumped together with other brands, thus eliminating the possibilities of either placing blame or praise on the "other" brand.

New Jet Compressor Uses Baked-On Lube

When Walter Kidde & Co., of Belleville, N.J., laid out its new Model 4-D compressor for actuating jet aircraft controls, landing gears, and bomb-bay doors, a sort of self-starting, cyclic problem was on hand to make things tough.

First, of course, was the desire to make the Model 4-D as light and compact as possible. This was neatly solved by making both the cylinder walls and the pistons out of 24ST-4 aluminum alloy. The cylinder walls, in addition, were chromium plated.

But, with that done, there came this problem: how to prevent the aluminum in the compressor's heart from being scored during the break-in period of operation?

With the compressor operating at 3,750 rpm the problem was a crucial one. (The compressor delivers four cubic feet of free air per minute, and at all altitudes, when pressurized from jet aircraft engine).

The solution hit upon and used by the makers of the compressor will be of interest to all who have watched the proliferation of difficulties in lubrication as jet engine stresses have mounted.

In the Kidde 4-D compressor, the stress and potential scoring of the break-in period is solved by a .05-inch coating of colloidal graphite in an epoxy resin dispersion. This is sprayed on the affected parts then baked.

During break-in operations of the compressor, graphite from this hard-baked film penetrates surfaces of fast-moving aluminum parts. Scoring is thus successfully prevented in cylinders and on pistons.

After the break-in period and during normal operations the baked-on graphite surface may still be working its way into the parts but, according to the manufacturer's report, is unaffected by oils, solvents, or even heats of up to 500° F. Operational transition from break-in to normal is, therefore, smooth and efficient.

The graphite colloid in its epoxy resin dispersion is being marketed now by the Acheson Colloids Co., Port Huron, Mich. Its designation, for those who feel it may have potential answers for their own problems, is Dispersion No. 213.

TEL, Major Additive Passes Major Milestone

In all the modern talk of additives for fuels and oils, most people have almost forgotten the first and most important additive of all—tetraethyl lead.

Now, however, there is a dramatic reminder of just how widespread and significant a role this industry-shaping compound has played. From Ethyl Corporation, whose "Ethyl" antiknock compound has for many persons become virtually a synonym for tetraethyl lead, comes the announcement that the company has recently shipped its four billionth (4,000,000,000th!) pound of TEL compound.

Figuring on the basis of average use of the compound in the 32 years it has been a staple of gasoline production, this would mean that well over 520,000,000,000 (billion) gallons of aviation fuel and motor car gasolines have been improved with Ethyl antiknock compound alone, (Du Pont is the other great producer of the lead additive.)

Too, while other additives are capturing much of the publicity spotlight, good old TEL keeps marching on to even bigger use figures. Ethyl Corp., for instance, figures that TEL consumption today is double its level of only seven years ago.

To keep pace with the growing demand, in fact, Ethyl Corp. has repeatedly expanded the capacity of its Baton Rouge plant, the world's largest, and has also enlarged the capacity of its Houston plant, built in 1952, while Ethyl Corp. of Canada Ltd. currently is building an antiknock compound manufacturing plant in Sarnia, Ontario, to serve the growing Canadian oil industry.

One thing about the milestone in TEL production that is most significant for users, however, is the price factor involved. Today, according to Ethyl Corp. balance sheets, TEL sells for only about one-fifth of its original price in the 1920's when it began to open the new, high horizons of high performance fuel for the age of flight and speed.

SKYWAYS FOR BUSINESS

News Notes for Pilots, Plane Owners Operating Aircraft in the Interest of Business

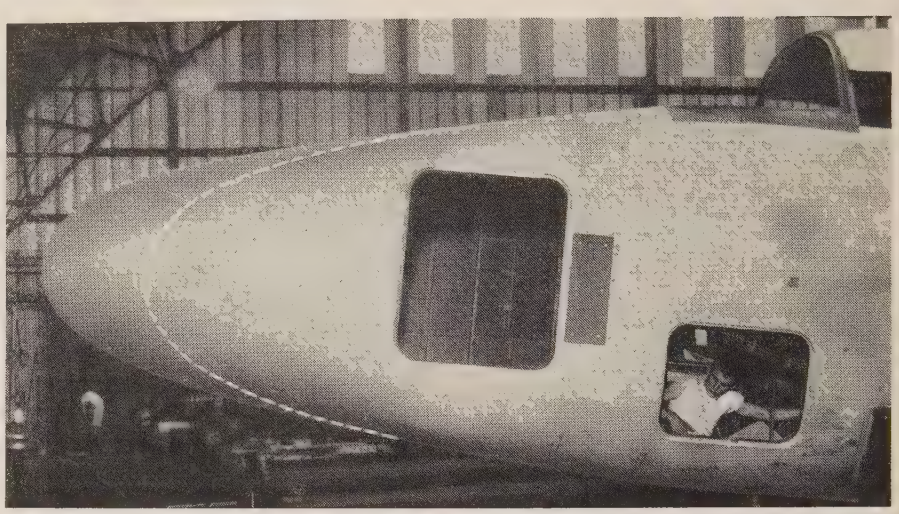
J. D. Reed Company Places First Firm Order for MS 760

Wichita, Kan. The first $50,000 priority deposit on the purchase of the new MS 760, four-place, twin-jet executive transport, was placed recently by J. D. Reed Company of Houston, Texas, for many years one of Beech Aircraft's top-ranking distributors.

Although the Houston distributor is the first customer to place a firm order for this first jet airplane to have been designed for private aviation, Mrs. O. A. Beech, president of Beech Aircraft, reported a number of other corporations have announced their intentions of buying the MS 760.

The MS 760 made its American debut in New York in June of this year and is currently enroute to the west coast on a demonstration tour.

As previously reported in SKYWAYS, the twin-jet business plane was built by the Morane-Saulnier Company of France. Beech holds an option to build the plane under license at its Wichita plant if the present tour indicates there is a sufficient market for this type of high-speed transportation. Price has been announced as "in the neighborhood of $300,000."



PLASTIC RADOME *lengthens the Learstar nose by 24 inches, blends perfectly with contour of the fuselage. The dotted lines indicate profile of nose before alteration*

Lear Announces Learstar-Lodestar Radar Installation

Santa Monica, Calif. Two production-line *Learstars*, on customer order for delivery this month, are being fitted with Bendix RDR-1B x-band radar with Racon station plotting facilities. Calling these installations the "first thoroughly aerodynamic airborne radar installations yet engineered for an executive airplane," U. Nelson Kelly, General Manager of Lear Aircraft Engineering Division, pointed out that the Lear installation's Fiberglas-plastic radome is faired to blend perfectly into the aerodynamic contours of the fuselage, eliminating the drag-producing reverse curvatures that are characteristic of the bulbous nose-on-nose installations which have appeared on several executive aircraft.

The radome is mounted on a new bulkhead at Sta. 14.5, just forward of the nose compartment radio rack. Existing radio installation is not disturbed, except as may be necessary to make space for the radar transmitter-receiver. By placing the transmitter-receiver in the approximate center of the radio rack, immediately aft of the scanner, the total length of the waveguide is held to a few inches, for minimum signal loss in the waveguide.

Two locations are provided for the scope and controller which are packaged as a unit. In its stowed position, it is aft of the copilot; in its normal operating position, it is aft of the control pedestral between the pilot and copilot.

Although the radome lengthens the *Learstar's* fuselage by some 24 inches, its improved configuration is expected to actually increase cruising speed by several mph.

The Lear-engineered installation is applicable to *Lodestars*, *Venturas* and *Hudsons* as well as to *Learstars*. Kits for field installation will be made available in the near future.

COMPANY PILOTS *for newly formed Executive Flyers, Inc., are (left to right) David McDowell, Bob Lyle, Charlie Pate. Base of operations is Southwest Airmotive, Dallas*

Douglas and Coast Pro-Seal Develop Corrosion Shield

Los Angeles, Calif. A solution to the problem of under-wing corrosion from exhaust gases, particularly from inboard engines, has been found in a development recently announced by Douglas Aircraft and Coast Pro-Seal & Mfg. Co., Los Angeles. Called Mylar Kit #1, it includes all necessary materials and detailed instructions for cleaning all surface contamination from each corroded area to which a .005-inch thick Mylar shield is applied and perfectly sealed to the formerly corroded area. It is a simple time-saving operation, and all that is ever needed thereafter is to wipe the Mylar sheets clean. This takes but a few moments compared to the time-consuming under-wing cleaning job that, until now, has been necessary at frequent intervals throughout a year.

Data sheets explaining in detail the procedure and material used are available on request to Coast Pro-Seal & Mfg. Co., 2235 Beverly Blvd., Los Angeles 57, Calif.

North American Van Lines Buys New Business Plane

Fort Wayne, Ind. North American Van Lines, Inc. recently purchased a new Beechcraft Super 18 executive airplane, the second to be owned by the company.

James D. Edgett, president of North American Van Lines, flies an estimated 3,000 miles a month in the company plane and with the additional time he spends aboard commercial airlines his total air mileage over a year averages 50,000. One year, Mr. Edgett covered over 100,000 miles by air.

Company pilot is Frank W. Tranter, and the new Super 18 is based at Baer Field, Fort Wayne.

New Schedule of Charges Posted By Westchester County Airport

White Plains, N.Y. Adjusted schedule of charges for Westchester County Airport became effective on September 1, according to Robert W. Gallaway, airport manager.

Following is the new scale:

1. For each take-off of an aircraft based at Westchester, other than one owned or operated by a flying club, or being used for flight instruction . . . . . No charge.

2. For each flight hour of an aircraft based at Westchester and owned and operated by a flying club . . . . . landing area toll of $0.50.

3. For each flight hour of an aircraft based at Westchester, when used for flight instruction . . . . landing area toll, $0.75.

4. For each take-off of an aircraft not based at Westchester . . . landing area toll based on this schedule:

Max allowable gr wt T/O		**Toll**
More than	Not more than	
0	2500 lbs	$ 1.00
2500 lbs	7500 lbs	1.25
7500 lbs	12,500 lbs	2.50
12,500 lbs	20,000 lbs	3.50
20,000 lbs	30,000 lbs	5.00
30,000 lbs	50,000 lbs	7.50
50,000 lbs	75,000 lbs	10.00
75,000 lbs	100,000 lbs	15.00
100,000 lbs	125,000 lbs	20.00
125,000 lbs.	—	25.00

Aircraft Parking, Storage Area charges:

1. For time not exceeding one hour . . . NC

Additional time:	1st 8 or frac	Add'l 8 or frac	Per Mo
a. Each aircraft not over 2500 lbs max allowable gr wt T/O	$0.50	$0.25	$20.
b. Exceeding 2500, but not 7500 lbs.	.75	.50	30.
c. 7500/12,500	1.00	.75	45.
d. 12,500/20,000	1.25	1.00	60.
e. 20,000/30,000	1.50	1.50	90.
f. 30,000/50,000	1.75	1.75	105.
g. 50,000/75,000	2.75	2.75	165.
h. 75,000/100,000	3.00	3.00	180.
i. 100,000/125,000	3.25	3.25	195.
j. over 125,000 lbs.	3.50	3.50	210.

Public Ramp Area (loading, unloading):

1. Thirty minutes ..... NC
2. Each additional 20 minutes or fraction $5.00

. . . . in the business hangar

Frankfort Oil Company's Aero *Commander* now boasts a Flite-Tronics MB-3 marker receiver. Installation was made by Aerotron Radio Co., of Tulsa. Home base for the business *Commander* is Bartlesville.

The Farnsworth and Chambers DC-3 is in the shop at Pan Air Corporation, New Orleans for an exterior paint job. Chief Pilot is Glenn Bjelland and Houston, Texas, is the DC-3's base of operations.

The executive *Lodestar* owned by Los Angeles oilman and industrialist, Edwin W. Pauley, is undergoing custom modification at Lockheed Aircraft Service, Inc., Burbank. Milton Keyes, Pauley's chief pilot, is overseeing the job. William Jones is his copilot.

Burk Royalty's Cessna 310 has been at Aeroton Radio, Tulsa, for installation of a Flite-Tronics MB-3. The 310 is based at Wichita Falls, Texas.

Ed Osborn, pilot for Hershel California Fruit Products, San Jose, brought his company's Cessna 310 to San Jose Avionics Co. for a complete ARC dual radio installation, featuring a full edge-lighted radio custom control and instrument panel.

The E. R. Squibb & Sons Division of Olin-Mathieson Chemical Co. has had its DC-3 converted to 26,200 pounds gross weight and R-1830-94 engines installed. The work was done by Butler Aviation at LaGuardia Field, N. Y. The -3's crew are John Rintoul, Jim Traggis, and Al Nelson. Neil Fulton, chief pilot, is his company's NBAA representative.

Columbia Gas System's Lockheed *Lodestar* is back in operation after a complete tank resealing job by Don Bower of East Coast Tank Service. The work was done at Columbia's base of operations, Hangar D, at Westchester County Airport, N.Y.

A 12-place *Learstar* recently was delivered to Harold S. Vanderbilt. Mr. Vanderbilt's chief pilot, Capt. William H. Faulds, accepted the *Learstar* from Elmer Easton, sales manager of Lear Aircraft Engineering Division. Like most of the other *Learstars* delivered to date, Mr. Vanderbilt's is equipped fo transoceanic flight as well as domestic operation.

Southern California Aircraft Corporation recently delivered an executive DC-3 to Pittsburgh Plate Glass Co. Chief pilot for the Pittsburgh company is C. E. (Buck) Newton. Both Pittsburgh Plate Glass and Southern California Aircraft are members of the Natonal Business Aircraft Association.

Coca-Cola's DC-3 has been at Remmert-Werner in St. Louis for a new paint job, 100-hour inspection and an engine change. Coca-Cola's chief pilot and NBAA representative Ralph S. Whitworth, Jr., brought the -3 to St. Louis but then had to hurry back to home base, Atlanta, to celebrate the arrival of a new daughter, Barbara Ann.

Burroughs Corp., of Detroit, recently took delivery of a new *Learstar*, and the United States Steel Corporation placed its order for two of the high-performance executive planes.

Narco DME installations recently have been made in the Burroughs Corp. *Learstar*, the Rockwell Spring and Axle Company's DC-3, Ohio Oil's Lockheed *Ventura*, Thompson Product's DC-3, Essex Wire Company's *Lodestar*, and National Automotive Fibre's DC-3 by Anderson Aircraft Radio, Detroit.

Safe Flight Instrument Company's business DC-3 has been at Air Service, Inc., for installation of a R-200 Janitrol heating system. The Safe Flight -3 is based at Westchester County Airport, N.Y.

Outboard Marine & Manufacturing Co. has taken delivery of a new and luxuriously appointed DC-3 from L. B. Smith Aircraft, Miami. Capt. Jack Losee is chief pilot for Outboard Marine, Waukegan, Illinois. Interior design of the DC-3 was created for Outboard Marine by Charles Butler Associates, New York.

Poddy Parrish brought Trinity Drilling Company's *Lodestar* to Southwest Airmotive for landing gear repair and 100-hour check. Also at Southwest for 100-hour inspection is Williamson and Dickie's PV-1, brought in by Pilot C. D. MacLean.

Minneapolis *Star and Tribune's* DC-3 is back in operation after a new paint job, interior work and a 100-hour check at Wiplinger Aircraft Service, Fleming Field, South St. Paul, Minn.

The Cessna 310 owned by Suderman & Young Towing Co., Inc., Galveston, Texas, has been equipped with a Flite-Tronics CA-1 Audio Amplifier. Continental Radio, Houston, Texas, made the installation.

EVER LAND A JET ON A

U.S. NAVY'S TOUGHEST PILOT-TRAINING PROBLEM MADE EASIER BY WORLD'S SAFEST JET TRAINER.

LOCKHEED **T2V-1**

Once you try it, you know there's nothing trickier than setting down on a carrier at jet landing speed. Add fickle winds to a pitching, yawing, rolling deck, and there's plenty to think about, especially during early training.

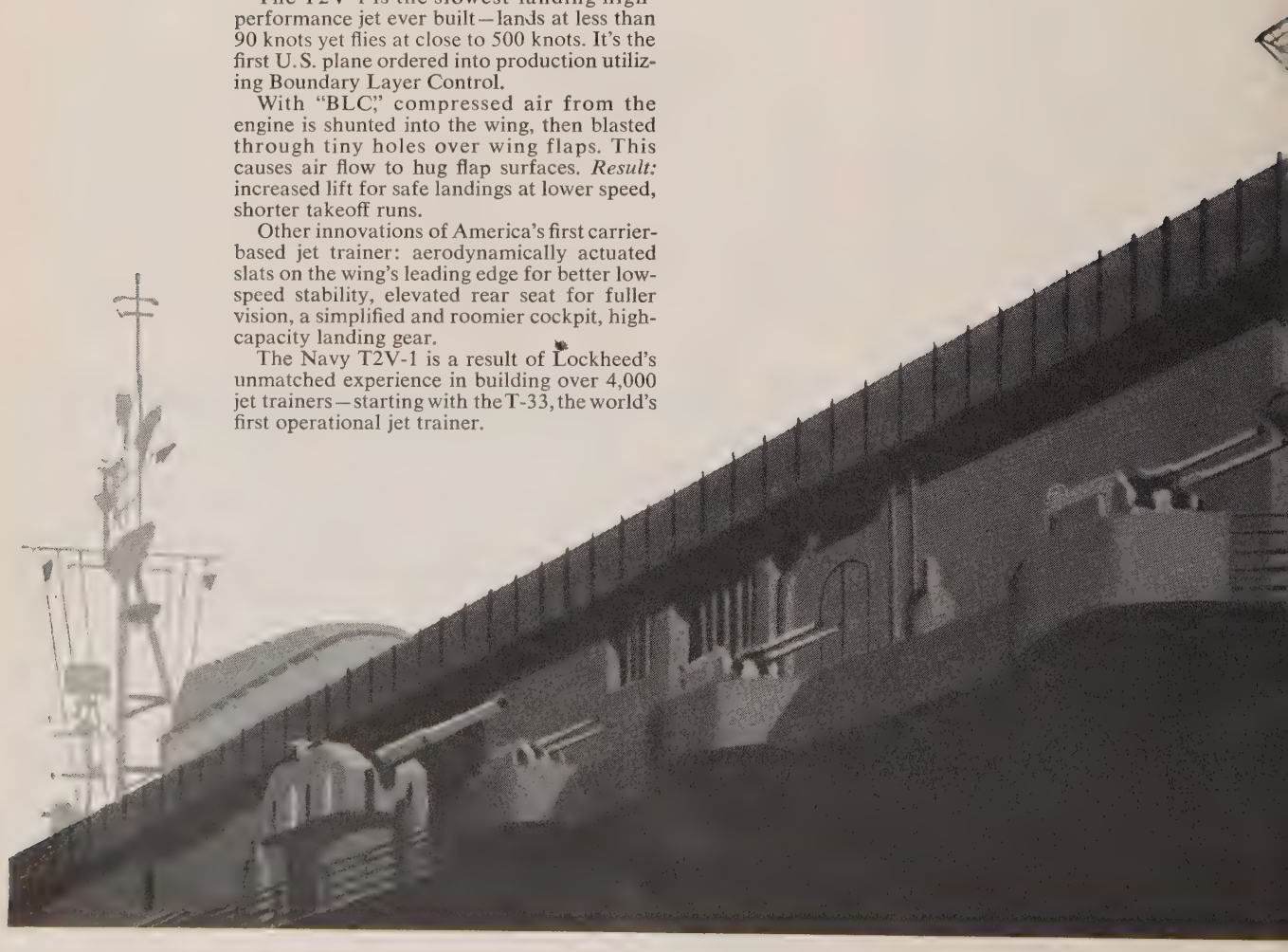
That's why the Navy needed the world's safest two-place jet trainer. It's now in production at Lockheed.

The T2V-1 is the slowest-landing high-performance jet ever built—lands at less than 90 knots yet flies at close to 500 knots. It's the first U.S. plane ordered into production utilizing Boundary Layer Control.

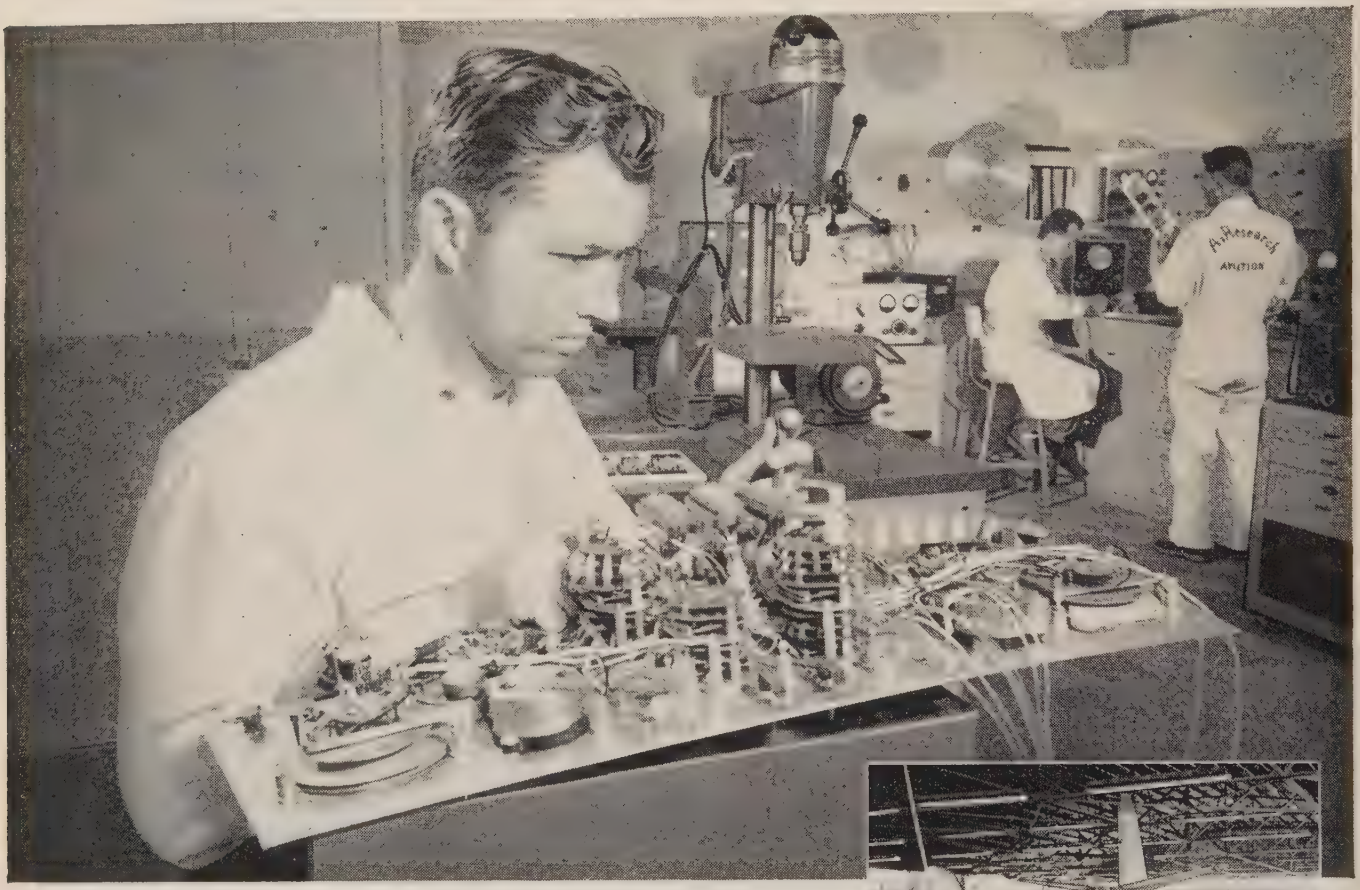
With "BLC," compressed air from the engine is shunted into the wing, then blasted through tiny holes over wing flaps. This causes air flow to hug flap surfaces. *Result:* increased lift for safe landings at lower speed, shorter takeoff runs.

Other innovations of America's first carrier-based jet trainer: aerodynamically actuated slats on the wing's leading edge for better low-speed stability, elevated rear seat for fuller vision, a simplified and roomier cockpit, high-capacity landing gear.

The Navy T2V-1 is a result of Lockheed's unmatched experience in building over 4,000 jet trainers—starting with the T-33, the world's first operational jet trainer.



Now! Finest radio and electronics service center for business aircraft!



VISIT OUR SHOPS at the International Airport in Los Angeles. Meet our unsurpassed staff of electronics engineers and FCC technicians, all thoroughly experienced in aeronautical communications. Examine the finest equipment and test facilities in the country.

No expense has been spared at the new AiResearch Aviation Service electronics center to provide business aircraft with the kind of complete service facilities previously only available to the airlines.

This department is completely set up to handle radio sales, engineering, design and installation, as well as the service and repair of aeronautical communications and navigational equipment. We are CAA certified for Class I and Class II.

A complete line of electronic equipment and parts is stocked for immediate delivery. Brands include COLLINS —BENDIX—WILCOX—RCA—SPERRY—ARC.

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AiResearch Aviation Service Division

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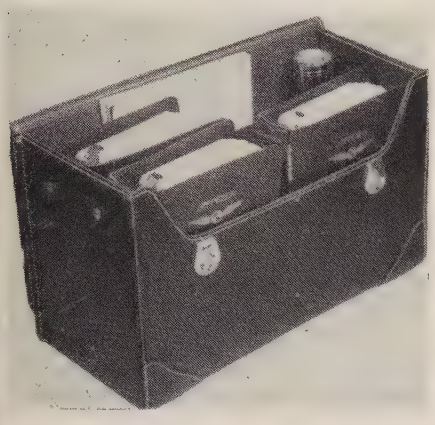
SERVICE FACILITIES. AiResearch offers the most complete facilities in the country in all phases of aircraft service. This includes rapid and efficient turn-around service.

REBUILDING AND MODIFICATION. Complete engineering modernization service, outstanding interior styling and fine craftsmanship combine to give your airplane high performance and luxurious comfort. Some satisfied customers are National Cash Register, Thompson Products, Humble Oil, Chicago Tribune and Goodyear.



JEP *flight case offers adjustable partitions; is available for $28.75 plus tax*

Jep Designs Ideal Flight Case for Stowing Charts

All the charts, maps and other pilot equipment in the world is of little value once it is scattered loosely around the cockpit in inaccessible places, under seats, behind instrument-panel cowlings, or jammed between control column and floor openings, etc. In fact, the lack of a practical, easy storage place from which to obtain maps and cockpit tools and then to put them back easily has been found to have been a contributing factor in some unexplained accidents.

The traditional pilot's mapcase has acquired almost the same recognizability as the pretty model's hatbox. Pilots today are most easily recognized by their "one-wing-low" walk as they struggle with their mapcase enroute to waiting crew cars. *(Ed. Note:* The stewardess usually carries the pilot's B-4 bag, or a little aileron trim would correct the stance and then who would know?)

Anyway, there may be nothing new under the sun, but there can always be something better. JEP, of Jeppesen and Co., Denver, once used to work real hard as an airline pilot before he hit on the big idea that pilots always get lost, and so designed a whole system of charts to keep them on course and eating regularly. Therefore, he knows intimately the shortcoming of flight bags that either defy all attempts at opening with one hand to get an approach plate as you come up on the gate fix somewhat ahead of your estimate, or sag like a Hollywood-version drunk when you try to replace an Airways Manual.

Jep was not satisfied with just semi-adjustable partitions so that you can set up the case the way you want it, plus intelligently arranged holders for pencils, flashlights, computers, etc. He even added "drag" and "lift" handles on the end sides for the unromantic ramp handler who doesn't want to acquire the pilot stance by lifting anything heavier than his paycheck.

The new Jep flight case is of vinyl-covered, fibre-board construction in the partitions, tough top grain cowhide, outside, vinyl-plastic lined inside, and the top swings back and "snaps" flat against the back of case—out of the way when bag is in use! No fighting a floppy top, once open!

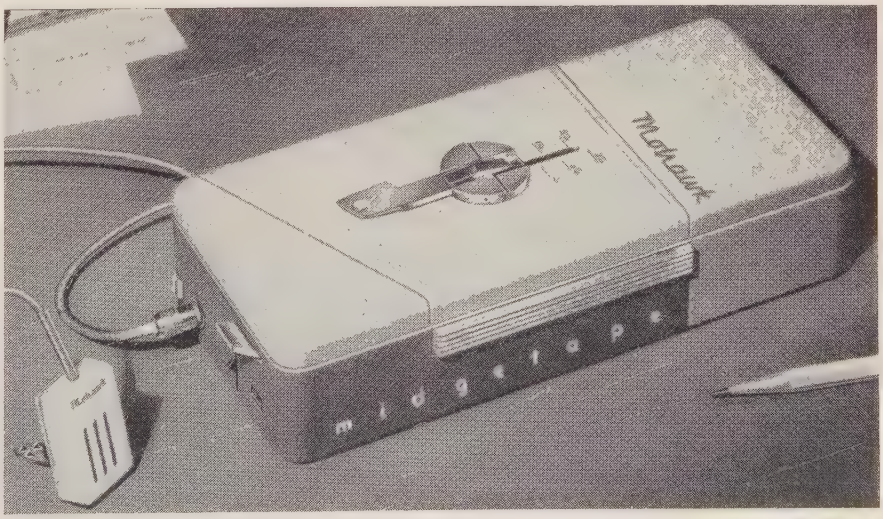
The price, $28.75 plus 10% excise tax justifies early replacement of older equipment and earlier order of the original equipment.

Handy Pocket Recorder Designed for Airborne Use

One of the advantages of our jet-atomic age is that comic strip characters no sooner come out with a new gadget than somebody announces a real-life version for public consumption. So it was with the Dick Tracy wristwatch radio; so it is with pocket-recording devices to make every man his own sleuth.

In the air-transportation business, an important item has become the recording of factual information, operational data, airways clearances or business negotiations or plans made while airborne. To briefly trace the history of this development, we can recall that at one time no ground-to-air radio transmissions were recorded. It was very quickly realized that, in the event of any incident such as an accident or confliction between aircraft, the reconstruction of the event for the purpose of determining the cause and preventing repetition, was often impossible without a clear record of pertinent radio transmissions. The first early practice of hand or typewritten records still exists in many company stations but, unsupported by factual sound recordings, it is challenged as true evidence of what actually went out over the air.

The inevitable next step was to adopt Dictaphone-type plastic or film loop recorders at all ground stations. With that it was possible to at least reconstruct what transmissions were made from the ground stations in the event of an untoward incident. Since this was only a true record of ground-to-air transmissions, pilots generally objected when inference was drawn from the ground-to-air transmissions as to their replied air-to-ground! In truth, radio reception in the low and medium frequency channels being what it was for years, there was much credence for the defense that ATC instructions, etc., were not heard or clearly understood and hence the traffic conflicts that resulted could not be fairly laid at the door of anyone, unless the ground operator's transmission was revealed to be in error.



MOHAWK *Midgetape is a pocket-size recorder weighing only three pounds. It records up to one hour of continuous transmission, and its tape cartridges are re-usable*

To employ a popular term, both pilots and ground personnel became "Philadelphia lawyers." When conflictions arose, pilots often failed to recall acknowledgments or responses indicated by ground personnel's transmissions. Similarly, ground personnel sought to protect themselves by repeating pilot's transmissions, ostensibly for confirmation purposes, but clearly and obviously to put the pilot "on the record."

Despite this, the value of a clear and complete record of both sides of such communications has become increasingly evident. Within the last few years, the CAA has taken the lead by introducing multi-channel two-way recordings at the largest and most important terminal areas. The expense of such luxury and the insufficiency of budget allotments so far has limited this progressive step to terminal-area locations. By and large, ATC and enroute communications remain ground-to-air only.

As with many other developments in the navigation and communications fields, it has been the corporation and business aircraft that have shown most sustained interest in developing the practice of airborne recorders. A few airlines at irregular intervals in the past have investigated the practicality of making their own airborne records but, with the obvious payload weight penalties of current portable recording devices, it was easy to decide in favor of pressuring "Uncle" to expand the two-way ground-recording systems at John Q. Taxpayer's expense. In the event of a subsequent investigation of a traffic confliction wherein an error of ground personnel was revealed, it was somewhat like having a court trial where your witnesses are paid by the other side!

Happily enough, the nature of much business and corporation flying includes the transportation of valuable, highly paid executives. The cost and weight penalties of accompanying secretaries or stenographers made the investment in even the heavier, early portable recording machines an attractive alternative.

It was an easy transition for some bright executive captain one day to set up the boss' recording machine so that he could repeat back into it, simultaneously with his radio microphone, any pertinent air-to-ground transmissions. The next natural step was to have a radio maintenance man tie it into the system so that convenience became possible. Undoubtedly, a problem arose thereafter as to who had priority in its use, the boss or the pilot!

By far more fascinating is the use of airborne recorders in such company work operations as pipeline patrol, surveying, mapping and photo-flying, inspection, prospecting and many other flying jobs where note-taking is a necessary chore at the most disadvantageous times and positions. This is especially so where a pilot has to do both the flying and work chore. Use of lapel pin and throat mikes free the pilot's hands to make the job easier.

It is easy to visualize, and we suspect that it is already being done, photo-mapping with a running commentary on a recorder the ultimate in efficiency of the above type operations. Newspaper planes covering hot events could come home with fresh on-the-spot impressions of airborne reporters for transcription to copy desks in a style far superior to current rewrite from scribbled notes.

If you have ever carried any of the most efficient and popular makes of recorders, you can readily recognize the objections to dual installations to cover all needs. Like everything else airborne, reduction of weight and size is the everpresent order of business.

(*Continued on page* 61)

AIR-AIDS SPOTLIGHT

ARCHBOLD, O.—*ADF beacon on 271 kc, "ACB" long-familiar landmark on Green 3 Toledo to Goshen decommissioned.*

BALTIMORE, Md.—*VOR approach cancelled account new TV tower construction!*

BRUNSWICK, Ga.—*VOR decommissioned for relocation. Approach cancelled.*

CLEVELAND, O.—*North Royalton FMarker on SE course CLEVELAND to AKRON on Red 20 decommissioned.*

EL CENTRO, Cal.—*NWand SE courses LFRange swung to 179°-359° (N/S) to increase dogleg bend Victor 117 THERMAL to EL CENTRO.*

FORT MEYERS, Fla.—*ADF beacon was due to be commissioned Sept. 1.*

GLENDALE, Cal. — *GRAND CENTRAL AIR TERMINAL tower frequency now 121.3 mc.*

JANESVILLE, Wis. — *VORW frequency changed to 113.0 mc and location moved approximately 7 miles WSW of old site.*

JOPLIN, Mo.—*ILS out until end of year. Outer and Middle Locator okay.*

LANGLEY, Va—LFRange operating on test basis until about November.

LOS ANGELES, Cal.—*DME commissioned at VOR site.*

LITTLE ROCK, Ark.—*2,205-ft. msl TV tower erected on NW course LFRange 17 miles out on Blue 22, VAN BUREN to LITTLE ROCK.*

NEW YORK AREA—*Center radar commissioned on easterly routes on 118.9, 120.7, 120.9, 121.5, 124.3, 125.5, mc. Also guards 121.1 mc.*

—IDLEWILD *tower guarding 122.7 mc in lieu of 122.5 mc; 118.1 discontinued. New approach light system involving condenser discharge and standard "A" type centerline due to be commissioned this month.*

—FLUSHING *airport now geared to service business aircraft of medium twin class. Strict observance of pattern and CARegulations required by management. Low-visibility operations restricted by LGA through field management. Runway lighting to be available on limited basis on request.*

OMAHA, Neb.—*ILS Glide Path raised to 3° to conform more closely to interception altitude over Outer Marker, and level off altitude at Middle Marker.*

PEORIA, Ill.—*BVOR commissioned on 115.2 mc. "PIA" located approximately 5 miles WSW of LFRange.*

PUEBLO, Col.—*VOR due resume operation in new location 5 miles east of Municipal airport on 112.0 mc.*

RICHMOND, Va. — *1,049-ft. msl TV tower erected 8 miles south of LFRange in procedure turn quadrant, where minimum is 1500′ for turn!*

TALLAHASSEE, Fla. — *ILS Glide Path commissioned. 2.85° slope with Outer Marker altitude 1220′ msl, Middle Marker altitude 295′.*

WASHINGTON, D.C.—*TVOR due to resume operation on 110.6 mcs.*

WILKES-BARRE — *ILS frequency changed to 110.3 mcs.*

Now Twin-Engine Business Transportation at Practical Cost with the PIPER *Apache*

Now in higher production than any other commercial multi-engine airplane and already in the service of many leading corporations, the twin-engine Piper Apache admirably fills a long-felt requirement for a fast, economical, twin-engine airplane.

Powered with two 150 horsepower Lycoming engines, the Apache cruises 170 mph at optimum altitude yet can land as slow as 52 mph to permit using any existing airport. And since it represents just half the investment of most other twins, there's little wonder that acceptance of the Apache by American business has far exceeded expectations.

If your company already uses single-engine equipment, the Apache might well be the next logical step for round-the-clock utility. If you already operate larger multi-engine equipment, the Apache is an ideal supplement to extend benefits and savings of company air travel to more key personnel more often.

Or if you have not felt, up to this point, that investment in a company airplane was justified, a study of the Apache's unique capabilities, unusual safety features, and substantial money-saving economics may well permit you to revise your estimates.

Your Piper distributor will be glad to help you with such an analysis and demonstrate the Apache to you. For a complete 24-page manual on the Apache write on your letterhead to Executive Sales Department, Piper Aircraft Corp., Lock Haven, Penna.

PIPER AIRCRAFT CORPORATION
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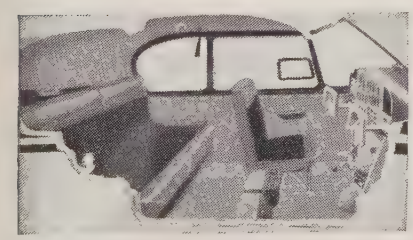
PROVED AND ACCEPTED

Transoceanic flights have *proved* Apache stamina—one flew 3,600 miles non-stop, New York-Paris; a second, non-stop across the North Atlantic; a third, non-stop across the South Atlantic; many to South America. All routine delivery flights!

Here are a few of the hundreds of corporations and individuals who now own and operate Piper Apaches:

Ashland Oil & Refining Co......Ashland, Ky.
Branyan Drilling Co......Cushing, Okla.
Buttrey Stores, Inc......Minneapolis, Minn.
Clinton Machine Co......Maquoketa, Iowa
Crosley Broadcasting Corp......Cincinnati, Ohio
El Paso Natural Gas Co......El Paso, Texas
Florida Power & Light Co......Miami, Fla.
E. & J. Gallo Winery.....Modesto, Calif.
C. F. Kettering, General Motors Corp...Dayton, Ohio
Miller Construction Co......Windsor, Vt.
Odessa Natural Gasoline Co......Odessa, Texas
Pursglove Coal Co......Clarksburg, W. Va.
Reynolds Metals Co......Richmond, Va.
Sinclair Oil & Refining Co......Caracas, Venezuela
St. Johnsbury Trucking Co......St. Johnsbury, Vt.
United Fire & Casualty Co......Cedar Rapids, Iowa
Uranium Enterprises.....Grand Junction, Colo.



Comfort. Wide rear seat and individually adjustable front seats in quiet, luxurious, spacious cabin make Apache travel truly restful for four people.

Night and Day. Two dependable engines and full instrumentation give the Apache owner round-the-clock, night and day utility. Cruises 170 mph.

On One Engine, Apache maintains 6,750-foot ceiling at gross load; 8,000 to 10,000 feet with average load. Twin-engine ceiling is 20,000 feet.

Controlled Air Traffic

(*Continued from page* 20)

the last moment. Opinion among these corporate operators seems to point in favor of raising the VFR minimums in certain areas. They believe, for the most part, that it should be feasible to restrict all altitudes above 3,000 feet (consistent with terrain clearance) to IFR traffic only, thus permitting uncontrolled operation in the lower 3,000-foot strata above the terrain. It is their feeling that this restriction should exist, however, only to a point 25 miles from high-density control areas, and that at this point the controlled traffic should be from the ground up. Unfortunately, this particular solution is complicated by the ever-increasing number of tall television towers that impinge on the airspace to height sometimes exceeding 2,000 feet above the terrain.

Any professional pilot can recite numerous instances of being forced to take evasive action to avoid collision with another aircraft in haze and even when on top of solid-cloud conditions, only to learn later that the aircraft in question was being operated on a VFR flight plan.

It should be pointed out that under the most favorable conditions of visibility serious problems still interfere with the effective sighting of other aircraft in flight. These problems are the result of several factors, namely:

1. Blind areas caused by the inherent structure of the aircraft cockpit.
2. An aircraft being between the sun and the observing aircraft.
3. Confusion of aircraft lights with other lights on land or water, or even with reflections of lights inside the cockpit.
4. Spots of dirt on the windshield.
5. Glare shields left in place when not absolutely needed.

The complexity of the cockpit, with its complicated instrumentation, requires an increasing amount of attention from the pilot. Therefore, as a result of even minimal attention to cockpit detail, a substantial part of the time the pilot's eyes are focusing inside the cockpit. In the high-density areas a large percentage of aircraft in operation are operating at speeds in excess of 400 feet a second, and it is not operationally feasible at this time to require equal speeds of all aircraft in such an area. It should be perfectly clear, therefore, that aircraft, if on a constant closure angle, must be seen at a distance approaching three miles to avoid a collision.

The writer has discussed this problem with many pilots in many segments of the flying industry, as well as qualified air traffic controllers. Almost without exception the response has been expressions of deep concern over the existing VFR regulations. At the present time CAA is considering certain changes in these rules and this will be a step in the right direction. The considered opinion of most of the people to whom the writer has talked, however, is that positive control should be implemented as soon as practicable in *all* high-density areas. There is no justifiable reason why an aircraft, due to lack of facilities or lack of proper position reporting, should be allowed to endanger the safety of other aircraft. The rapid implementation of ground radar would minimize the requirements for extensive airborne navigation equipment for small aircraft.

It seems reasonable, therefore, to require all aircraft operating into definable high-density areas to operate with a flight plan which, of course, would make two-way radio a requisite. It also seems reasonable to require that VFR visibility minimums be raised to at least five miles in these high-density areas.

It does not seem unreasonable that if a "thousand on top" is considered minimum safe practice, a thousand feet *below* all clouds also should be required in the interests of safety.

The entire situation is possibly best summarized in the words of Dr. Edward Warner, taken from a speech delivered at the SAE Aeronautic Meeting in New York, April 18, 1955. Dr. Warner said: "Unless vision can be supplemented by direct electronic warning of the proximity of other aircraft approaching collision courses, increasing traffic and increasing performance will inevitably force a restriction on the conditions under which vision alone can be depended on. As aircraft become faster, they have to be seen farther away to permit evasive action; but as they become faster they also become finer in form and harder to distinguish even at the distances that seemed sufficient in the past. As the inevitable consequence, near or remote, the range of conditions permitting VFR and uncontrolled flight will shrink. Regulation has no friends; but additional regulation, unwelcome as it is, will become inevitable if increasing traffic and increasing speed overload the pilot's capacity for watchfulness and he receives no new aids to supplement his limited senses."

VFR Flight

(*Continued from page* 21)

fuselage lights similar to the approach light system of same name, and there is good evidence that it not only is a terrific attention-getter but it definitely establishes the direction of flight!

Little has been said about rear-mirror arrangements. Does no one ever get overtaken? How easy it would be to eliminate that blind spot and reduce the hair-raising sensation along your spine when flying a busy airway in marginal visibilities. When the tower operator tells you, the pilot, that there is an airplane a short distance behind you, do you sit there, light up a Lucky and leave it to the other guy, or do you get fidgety and kick that rudder a little both ways while you and your co-pilot, if you have one, scan the area just behind that precious tail?

Is there a reasonable solution without unduly restricting the right of free airspace to anyone? I think there is!

Too many airplanes want to enter, depart from or navigate through a certain airspace over a metropolitan area in restricted visibility. Under "solid IFR" conditions we have no comparable problem—with moderate delay, most aircraft will get in or out, protected by procedures, by airspace blocks, and by radar.

When the weather is "CAVU", however, some problem exists in that rates of convergence of aircraft from any point in a global sphere surrounding the pilot, are too great for early safe recognition of the impending conflict. Here, some form of speed control needs further investigation. "Burning up the road" out on a cross-country turnpike may be both legal and desirable, but when inside the city limits, only the most suicidal driver would try to maintain the open-road speed! Even five miles visibility will not be enough if two pilots insist on coming at each other at collective speed of 10 miles-per-minute! Maybe it will be literally necessary to enforce a "speed limit" within the high-density area from the approach gate to the runway. ATC will fight any suggestion that they police this regulation, but radar can be the means of enabling a more appropriate agency to do this. And performance-wise, the hotter airplanes can still stay in the air and maneuver safely within a speed bracket attainable at the cruise figures of the slower aircraft that would be using a high-density airport.

In the typical high-density terminal area, CAR 60 already has banned the commonly referred limits of 1,000-foot ceiling because of the terrain problem previously mentioned. This, however, has not stopped some individuals from barging into said areas under such conditions, blissfully ignorant of the thundering herd letting down on top of them (and 500 feet below clouds is even worse than 500 feet on top was!)

But—"the airspace is a public asset!" So, how can one go safely in, out or through such an area without the arduous and the almost impossible chore of getting an "ATC-clearance" from an already overburdened tower?

It can be done! The professional pilots of all classes inbound to any terminal airport in marginal weather instinctively tend to adhere to a flight path they are accustomed to fly when on IFR plan. Similarly, they seek and get ATC-separation from others wisely operating under the same conditions. Also, they are probably universally in agreement that 3 miles visibility is inadequate at such times.

So let's re-establish the discontinued approach zones of pre-war days and make it quite clear that all such traffic, by remaining within these zones, will be able to obtain reasonable assurance that no itinerant, uncontrolled aircraft will cross their paths, at or above the minimum prescribed instrument altitudes. Not only will this limit traffic and hence the hazard but it does not place additional burden on towermen already so employed. *Within these zones, flight must be controlled with less than 5 miles visibility or 2500-foot ceiling!*

What about the lightplane pilot who wants to go from A to B within this area, or in and out of uncontrolled Airport C within the general metropolitan area? Is his life any less precious today than in wartime? Is not the question of his personal safety and right of egress as important today?

During the afore-mentioned periods of national emergency and war, it became necessary to prescribe certain areas as off-

(*Continued on page* 44)

Modern Aviation Insurance

Tailor-made for private and company-owned aircraft

North America keeps abreast of aviation with coverages modern as tomorrow's planes.

Whatever your needs, North America will fit its policies to them. This means you can have your protection tailor-made to private or company-owned aircraft. With this coverage goes North America's fast, professional service that is based on the experience and know-how of our Aviation Department.

No matter how specialized or unusual your requirements, you will get the most complete service from North America. Call our Agent, or your own broker, about this modern coverage and service.

NORTH AMERICA COMPANIES

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limits to aircraft not operating as public aircraft. As picture developed, it became obvious that adequate control and security could be achieved by establishing corridors for purpose of flying in and out of sensitive areas. Everybody complied in public interest and traffic was unhampered.

Therefore then, why is it not practical to navigate into or out of any peripheral airport without intruding on the terminal airport approach zones? And in 3-miles visibility rather than 5? And inasmuch as there are established minimum altitudes for the approach gate fix of every instrument approach, the airspace outward from that gate and below that fixed altitude would belong to the non-controlled flyer (this is not the ridiculously impractical 700-foot regulation current today.)

For enforcement purposes, the non-controlled aircraft found within the instrument approach zone with reported conditions less than 5 miles and 2500 feet would be in clear violation. Similarly, the aircraft enroute to the high-density terminal found outside the prescribed horizontal and vertical limits of the approach zone would also be in clear violation.

And so, if we must have safety at a price, let's spread the cost out a little more democratically. Let the professional pilot enjoy his much-needed airspace, but let him also share with the other taxpayer a little of the national asset which belongs to us all. And let the "little guy" take the same attitude while cheerfully winging his way through a sky not complicated by stuffed clouds.

Wilcox CANARI

(*Continued from page* 15)

installation of an Omni Bearing Indicator (OBI).

Type 707A VHF Transmitter—360 crystal-controlled channels providing 25 watt output with 50-kc channel spacing from 118.0 mc to 135.9 mc. It is supplied in a ⅜ ATR case, including modulator, and weighs 13 pounds.

Type 708A Public Address Amplifier—inputs for Hostess, Cockpit, and Phono. Choice of 12 or 25 watts power. Weight: 8 pounds in a ¼ ATR case.

Type 709A Isolation Amplifier—10 relay-controlled inputs to a common amplifier. Choice of 12 or 25 watts power. Weight: 9 pounds in a ¼ ATR case.

Type 710A Isolation Amplifier—contains one permanent interphone channel, with provision for from one to five optional plug-in isolation channels. Weight: 5½ pounds in a ¼ ATR case.

Type 711A Computing Automatic Tracker (CAT)—a complete redesign of the famous final approach computer. Now in a ¼ ATR case and weighing only 2 pounds, there are *no* vacuum tubes and the chopper has been eliminated too. Both tubes and chopper are replaced with a magamp (magnetic amplifier). Optionally, this unit can be supplied with the Type 712A 400-cycle power supply built into the same ¼ ATR case so that the CAT and ADF units will require only DC input, both obtaining what AC 400-cycle voltage they need from the AC supply in the 711A.

Type 712A AC Power Supply—intended to replace rotating-type inverters where AC power requirements are low, this unit converts 14 or 28 volts DC into 115 and 26 volts AC, single phase, 400 cycles. AC power consumption must not exceed 15 watts total. Housed in a ¼ ATR case, the unit weighs 5½ pounds.

Type 714A Radar Safety Beacon—this unit, when installed in an aircraft, provides CAA Air Traffic Controllers with a means of positively identifying all equipped aircraft on their surveillance radar screens. Of all the units in the CANARI System only this one item was not designed in the Wilcox Development Laboratories. The Type 714A was designed in the Melpar Research Laboratories of the Westinghouse Air Brake Company, and Wilcox has purchased worldwide manufacturing and distribution rights on the unit. Housed in a ½ ATR case, the unit weighs 25 pounds. Melpar designed the unit to ARINC specification 532.

Choosing from the complete selection of units listed above, a CANARI System can

(*Continued on page* 48)

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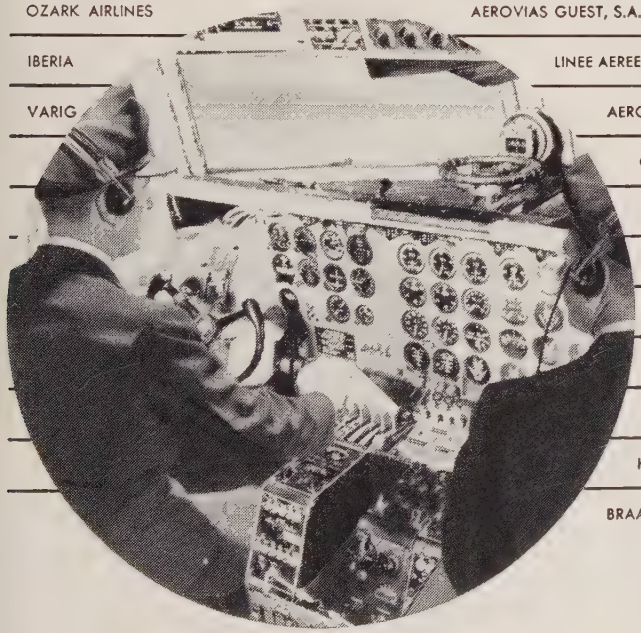

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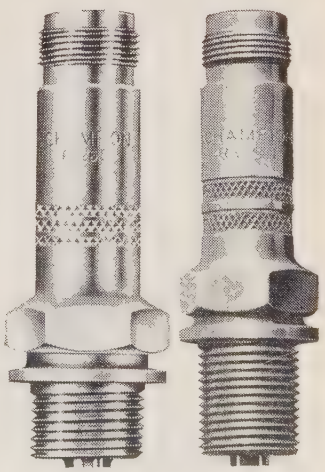

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Wilcox CANARI

(*Continued from page* 44)

be assembled for a wide variety of airframes. While the system was designed with one eye on the turboprop and turbojet transports, still largely in the drawing board and prototype model stage, it also offers the same weight and space advantages to today's propeller-driven transports. It marks the first time that airline quality equipment has been made small enough and light enough for smaller aircraft. For example, the Beech Model 50, the Aero *Commander*, and the Cessna 310 can easily accommodate an entire system of this type. It is believed that manufacturers, particularly those in the light twin-engine field, will appreciate the feature that permits them to purchase an electronics package, factory-wired, ready to assemble into their airframe, and small enough to be located more closely to the aircraft's center of gravity.

The versatility of the CANARI System, coupled with the fact that it is offered by one of the oldest and most respected names in aviation electronics, is sure to win it serious consideration by airframe manufacturers and aircraft operators, both large and small, who are planning new or modernized airborne electronics systems.

Round Table

(*Continued from page* 28)

isn't told, he may lose interest, particularly if the crew doesn't stay with the same airplane. Our system keeps the duplicate copies of log sheets in a book which accompanies the aircraft. These sheets contain flight squawks and a statement signed by the mechanic, reporting what work was done. Also, the aircraft is 'signed-off' by an A&E as airworthy and as having had all pilot write-ups worked off."

Robert Ellis: "We don't change crews much, and I wonder what the general practice is among other operators. What does General Motors do, Hal?"

Hal Henning: *"We find it necessary to change crews frequently because our utilization of the equipment reaches a point beyond the reasonable working day of a pilot. Each of our captains is qualified on at least two types. Due to the fact that we often have double trips on many of the aircraft in a single day, it is necessary for us to change crews. Here again, we have had to tailor our operating procedures to the demands of the operation. We realize it would be desirable to have the same crew with the airplane, but we can work an airplane longer without its breaking down than we can a pilot, so we do have to change frequently."*

Robert Ellis: "How much utilization do you get from an airplane under such operating conditions; your DC-3, for example?"

Hal Henning: *"It varies. Some months we average 75 to 90 hours on a piece of equipment. Other months it may go down to 50 or 65 hours, but that doesn't tell the true picture because in the 50 or 65 hours of one month, we may have had six or eight days when the airplane was extremely busy. It's a case of multiple trips on the same airplane over a few days in a month and then no demand for that airplane for a week or more. There is no regularity of demand that would tie utilization to the number of hours flown per month."*

Earle W. Bauer: "I would like to make it clear that we do not operate under a system which directly utilizes the pilot as a mechanic. We do, however, try to get closer working coordination between crew and maintenance staff so that we can secure better liaison, more analytical squawk lists and a well-versed knowledge of maintenance on the equipment. In fact, that is our primary objective, and we can do it because we have one crew established with one specific piece of equipment."

Hal Henning: *"Certainly the two systems are entirely compatible . . . and it all leads us right back to the fact that each company must tailor its maintenance operation to the characteristics of its flight operation."*

Steve Brown *(Chief pilot, Continental Can Co.):* "Hal, your point is well taken—that the hours of utilization of an aircraft each month do not present a true picture of what the crew has had to put up with. I know of many instances when our airplane and other companies' airplanes have RON'd for weeks at a time and the crew has stayed with the aircraft. While the boys may not be actually working, they are still on duty or on call. An airplane can be away from its home base night and day for a month and still fly only 30 hours during that month.

"Maintenance-wise, you can have your pilots trained as mechanics and insist that they analyze the work that must be done in the hangar. However, like Esso, we have found that there are very few cases where we find it necessary to so work our pilots. Their job is to fly the airplane when it's on the road and to handle the passengers in the correct manner. If they do that, we're all set."

Hal Henning: *"The second phase of our problem is the role of the engine, airframe and component parts manufacturers and overhaul shops. I believe we all are in agreement on the fact that our individual operations are not of sufficient size to justify our setting up our own maintenance bases to do complete overhauls. Therefore, we are dependent upon the services offered by the manufacturers and overhaul shops.*

"Joe Salzman, would you discuss this problem from the standpoint of the operator?"

J. R. Salzman *(Supt., Maintenance, General Motors Air Transport):* "The role of the manufacturer and the overhaul people is extremely important. Even though you start with a good product, it still has to be checked and/or overhauled properly, whether it be a light, medium or heavy overhaul or whether it's 100 hours, 1,000 or 8,000 hours. And considering this angle in the line of safety, I'd say the record is good. A fine job has been done and is being done.

"When you get into utilization, there may be some room for improvement. First, it's important to reduce 'down-time' on an airplane. The airplane isn't worth a nickel to its owner or user if it's in pieces on the hangar floor or on benches. To improve the 'down-time' situation, the airplane owner or whomever is responsible has to establish well in advance what needs to be done to the airplane. This will enable the overhaul operator to get in the necessary materials, to make certain the specialists who are going to be involved in the work are available and scheduled for the job. This is an area where there is work to be done. In some instances, the overhaul operator can speed up his job by having available the special tools and fixtures necessary to the job. Obviously, qualified mechanics are necessary; not only A&E's but those who specialize in hydraulics, for example, or electrical systems, etc.

"Another area where there exists a definite lack is in data and information concerning the service life of the various parts of an airplane. For example, how many landings is a tire good for; how many times can you land on the landing gear without having to be concerned about any trouble with it; how many hours is a generator good for . . . or a starter, a vacuum pump, etc? Sometimes we can increase the service life of a particular part by making minor changes in it or its installation. Some of us undoubtedly can remember when we used to take out spark plugs every 10 hours; now we're up to 200 hours and, in some instances, 500 hours. Therefore, there have been many improvements in service life, but there is room for even more.

"At GM we schedule engine overhaul at around 1,000 hours. If, one way or another, we could shove that time up another 200 hours, it would give us just that much more reduction in 'down-time' on the airplane.

"Another place where improvement would provide dividends is in better liaison between overhaul bases. I think that by mutual effort and cooperation an over-all improvement in in-and-out schedules could be accomplished. A favorable reaction from the owner or operator could be expected and would improve the prestige of the base operator.

"Also along these lines, perhaps the CAA could establish by aircraft types some sort of acceptable service requirement. In other words, let's assume you have a DC-3 and a base in the East gives it a complete going over. Then, 100 hours later, it is on the West Coast and you have a base there go over the airplane. Actually, it probably would get the same treatment it got on the East Coast, and I don't think it necessarily needs it. The reason your airplane is going to get that thorough going over is because the base that is responsible for it isn't going to release it without a complete check. Perhaps some arrangement could be made whereby each base would be held responsible only for the specific work it does on an airplane, and the Eastern base that performed the last 200, 300 or 400 hour check would still be responsible for that part of the work that they did. This idea would require the meeting of a lot of minds, but I think it would offer dividends."

George H. Weitz *(Chief, General Maintenance Branch, CAA):* "Joe, I think the answer to that problem is reflected in this new proposal that is going out in which, under progressive inspections, the inspection may be conducted by various individuals throughout the country when the airplane is enroute, and tieing that responsibility to the person who actually is conducting the inspection."

Hal Henning: *"Joe Chase and I had a little conversation before coming into this*

(*Continued on page* 50)

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TIP OF THE MONTH

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Round Table

(*Continued from page 48*)

meeting, and I know he has something to contribute from what he has picked up from several operators around the country."

Joe Chase (*Mgr., Maintenance & Equipment Div., Flight Safety Foundation*): "Judging from the comments that have come to us in confidence from pilots and operators of business aircraft, it seems there is room for better understanding between the operators of aircraft and the operators of approved repair stations on the matter of price and quality.

"The aircraft operator considers maintenance a means of securing an acceptable degree of safety, consistent operation and the protection of his investment. To him, price is a *secondary* consideration. But the repair station operator may feel that price is the major factor in his securing business, and he may interpret the aircraft operator's caution in financial arrangements as a reluctance to spend more than a few dollars. In consequence this may be reflected in his bid.

"Correctly or incorrectly, the overhaul operator may feel that the aircraft operator is willing to spend only so many dollars and, as a result, the overhaul operator's price must be within that range or he won't get the business. This has resulted in some criticism of the repair-base operator. Perhaps the answer lies in what Mr. Salzman has referred to as advance information from the aircraft operators which makes clear the kind of work he wants and, to take it a step further, a condition report from the base operator back to the aircraft owner so that he knows what has been found in the tear-down. When a repair station proceeds on the basis of putting equipment that has been unsatisfactory back in top shape and that repair costs more money than the aircraft operator feels is justified, the plane owner may say, 'Well, I wouldn't have done that; I'd have bought new equipment instead of putting that money in old stuff.' A proper condition report would eliminate many of these misunderstandings. This exchange of information between the aircraft owner and repair-base operator can and will eliminate hard feelings, many misunderstandings and much unjust criticism on both sides."

Hal Henning: "*Earle Bauer, would you put on your operator's cap and give us your ideas on the subject of getting along with the overhaul depot?*"

Earle Bauer: "Generally speaking, I'm in accord with Mr. Chase. Perhaps the greatest cause of our differences is this lack of liaison.

"One reason why we are doing the great majority of our own maintenance work is because we feel many repair-station operators do not have sufficient supervision for the work they are handling. Many of their personnel are relatively new and inexperienced. We admit there is an extreme shortage of good mechanics and that the operators are trying to make a living in a business that faces high competitive wage scales from other types of organizations. It's difficult to keep a good mechanic in the face of this competition. As a result, we find a number of workmen trying to complete a job on an airplane without a good reliable supervisor on hand for advice or help, and many times the work is accomplished in a not-completely-satisfactory-to-us manner. It isn't lack of desire or intent; the ones who are doing the job are doing the best they can, but they lack experienced help or guidance. Price factor enters into this problem quite frequently. A maintenance operator says, 'If I hire more supervisors and pay more for my men, I'm going to have to charge the aircraft operators more money.'

"We, of course, feel that prices are high enough, but we also feel that the maintenance-base operator should hire more working supervisory personnel, and we'd get our work done on time for the same amount of money. After all, it would run cheaper for the base operator, too, because the job would be completed more efficiently, the plane would be out of the shop, and his men ready to go to work on another airplane. Long lay-ups are costly to both groups.

"Perhaps our greatest fault, as an operator, is in not offering and, likewise, in not demanding better liaison between the depot and ourselves."

Hal Henning: "*Earle, you have indicated that maintenance-base operators are competing perhaps with the military for skilled personnel, and that you as a maintenance base operator are coming out second best in that competition.*

"*Leonard Lee, would you tell us what your experience has been?*"

Leonard Lee: "For the most part, Hal,

our experience has been very good—with the exception of down-time. We send an airplane into an overhaul shop with all the specifications laid out as to the amount of work to be done and, invariably, something arises to delay completion of the work anywhere from one to four or five weeks. That is our big gripe in overhaul shops. It's a problem in our own certificated repair-station operation, too. Our shop men over-estimate their ability and they under-estimate the amount of time involved. Like everyone else, we try to come up with a realistic estimate of the amount of time that will be involved in any given overhaul, but there are always those things that cause delays. Undoubtedly, with better liaison between the customer and the overhaul shop, these down-time problems could be whipped."

Hal Henning: *"Ted Wild, what has Union Carbide's experience been with overhaul shops?"*

Ted Wild: "I think it would help all aircraft operators if the overhaul shops could get together and establish a flat rate for various jobs that have to be done, and they should sell quality and service.

"Another thing, much of the information you get from manufacturers regarding the service life of components is ambiguous.

"When an outside agency shop is sent a piece of equipment for overhaul, the shop should be told on what airplane the equipment goes. In the case of a fuel pump or hydraulic pump, for example, you can turn the head of the pump around and it will fit on a different engine. If the overhaul shop does not know on what engine that pump is to be installed, then you've created a problem for yourself."

Frank Tobin: "In order to effect a reduction of aircraft maintenance, overhaul and repair costs, one must first establish the existing costs for each of the maintenance operations performed and, by so doing, classify the costs under routine and emergency expenditures.

"The routine items would cover scheduled inspections and overhauls, together with normal parts replacements. Whether or not the cost of accomplishing these items is commensurate with the required standards of workmanship can be established by investigation.

"Emergency expenditures cover unscheduled maintenance work, and costs in this category reflect faulty operations, maintenance and design limitation. Nevertheless, these items warrant priority consideration."

Hal Henning: *"Fortunately, we have representatives from the overhaul shops with us today. Tom Dickson of Airwork."*

Thomas Dickson, Jr. (*Vice President—Operations, Airwork Corp.*): "Basically speaking, it is impossible for an overhaul agency to do justice to an operator unless there is close cooperation between the two. It can't be an arm's-length proposition. A great many of the aircraft operators' problems stem from the fact that they just hand the overhaul shop a piece of equipment and say 'Here, this doesn't work, it's your problem. . . .' The operation of an overhaul shop isn't as simple as that and we have found greater success when the customer works more closely with us. Misunderstandings often arise when aircraft operators just drop a job in our laps and then don't work closely with us.

"Many problems would be eliminated if a qualified person, a representative of the aircraft operator, would come down to our place regularly and go over his company's problems with us, check on their equipment, etc. I'm certain we could come up with improvements in operations and in cost savings to the customer.

"On this subject of cost, you gentlemen must decide what you mean by cost. Is it initial cost or the cost in the long run? What we strive for is what is going to be the most economical for the operator in the end. An overhaul operation can vary standards a bit here and there and seemingly save you pennies, but that may cost you much more later on. However, those are things that can be worked out by your sitting down with the overhaul agency and going over specifications together.

"Joe Salzman's comments are very true. The more advanced planning we can do the more satisfied with the job you're going to be. In many cases manufacturers come out with improvements in engines and accessories, but it isn't always possible to secure those parts immediately. If we know your equipment is going to be in the shop, then we can place orders in advance and have the parts ready for installation when the equipment is there. We can't handle a job properly if you just come to us and tell us that you understand that such-and-

such a Bulletin is reported by some airline to give improved performance, and you want the same thing. In many instances, the parts aren't that quickly available.

"In summation, consider the operator and his overhaul shop as a team. Unless those concerned can consistently sit down and go over their problems and needs there won't be good results.

"If you like the outfit you are dealing with and have confidence in it, stick with it. Jumping from one outfit to another to solve a problem is not the answer."

Hal Henning: *"Mr. Frazee, would you comment on an exchange of information and not keeping so-called secrets in this business?"*

John D. Frazee (*Service Engineer, Pratt & Whitney*): "Pratt & Whitney tries to keep pilots and business-plane operators acquainted with its products through its distributors. Not too long ago we had a meeting at our place and we invited customers as well as distributors to come and discuss their problems. Airwork had a similar get-together in September.

"In addition to these meetings, we get out bulletins as fast as we can. We also have service representatives throughout the country and their job is to take care of our customers. We advise these representatives of whatever problems the airlines might be having and they, in turn, acquaint our business-plane operators of these conditions so that there is a mutual understanding of what is going on and what solutions have been devised for certain problems.

"Our home office is always available to any of our customers, whether they are buying directly from us or through some other source. Men are there to discuss technical problems.

"If there is anything else we can do to improve our service to any operator, we'd be happy to hear about it."

George Dickerson (*Chief Inspector—Airport Dept., Pratt & Whitney*): "A lot of interesting points have been raised here today. Referring to dissemination of information, we have a direct pipeline in our Pratt & Whitney Service Department and have a good cross-section of what goes on throughout the industry, and what difficulties people may be having. As far as interchange of information between overhaul shops is concerned, we get around to other overhaul shops and in that way we learn about many things.

"In my particular job as chief inspector, I'm interested in safety and quality and we know that safety is of primary importance to everyone. That is evidenced by the fact that most of the business-aircraft operators pull their engines at very conservative overhaul periods. We have close liaison with many of our customers and many of the pilots come in and look at their engines after they are torn down. In fact, we have one operator who watches us tear down his engines. This sort of thing is very beneficial in that it lets us know what each operator wants as far as service bulletins are concerned.

"As you know, Pratt & Whitney is quite a large organization. We not only design and manufacture the engines but also have set up a factory facility to overhaul our own product. We also maintain several aircraft for our own business use, including a helicopter, so we see problems from both the aircraft operator's and the maintenance-base operator's standpoint. We deal with our own pilots and know what their problems are. We have our own maintenance crew at our own airport and we have specialists in radio, sheet metal and even in aircraft interiors, so I think I can say we have a fairly comprehensive picture of the whole field."

Hal Henning: *"Ted Stilwell, what is AiResearch's experience or thoughts on this matter of overhaul operation and aircraft-operator cooperation?"*

Ted Stilwell (*Supt., AiResearch Aviation Service*): "Most people with whom we deal realize the importance of this tie-in between plane operator and the overhaul base. Certainly, the overhaul agency can do a much better job if the pilot or copilot gives it a report on the service the aircraft requires. Any clue regarding the trouble possibly being experienced will save time. Any problem would be run down eventually, but it would help if the pilot or copilot made a report.

"On the other hand, if you have a pilot who tells you exactly what he wants done and you do it, it's entirely possible that what you have done won't cure the problem, and that leads to unhappy situations. It's only human nature for every operator to have his own ideas about what his airplane needs, but if the plane operator and the maintenance operator will get together and talk over the situation, it would give the service operator a clearer picture of what the situation is, what has been done in the past, etc. All that information helps a lot, particularly if the aircraft operator wants work done on a more or less transient basis. If an airplane is based in the East and a service organization in that section of the country has done the overhauls, etc., then that service operator knows the airplane and is the best judge of what service may be required at what particular time. But, if the aircraft operator is on a trip West and stops in at a West Coast base and wants work done, the West Coast maintenance base isn't familiar with what has been done in the past. We all have probably experienced the situation where we see something on an airplane and decide it can go for another 100 hours before work is done on it, whereas an operator not experienced, work-wise, on that airplane wouldn't want to stick his neck out, so to speak, so he goes to work to fix it. If there were a representative on hand, the base operator could point out to him what the condition is and the aircraft operator could make the decision regarding fixing or not fixing it. It would make a much happier relationship.

"This is not a situation that exists for AiResearch alone. Overhaul agencies across the country have the same problem. Therefore, closer liaison between aircraft operator and maintenance-base operator is a major factor.

"As far as costs are concerned, a lot of operators have been spoiled, or were spoiled after the war, by the availability of surplus equipment. After the war you could pick up surplus accessories, engines, etc., a lot cheaper than you could have your old ones overhauled, and this kept maintenance costs down. However, as time

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went on, surplus material became scarce, and accessory overhaul agencies began to open up. Some of them did a good job and charged accordingly, and the aircraft owner squawked when he considered those charges in the light of what the surplus equipment had cost him. The thing the aircraft operator has to remember is that his operation is no better than the overhaul and maintenance of the equipment he is flying."

Hal Henning: *"The third phase of our discussion today is the role of the CAA and CAB in business-aircraft maintenance. Mr. Weitz, would you expand your earlier remark about the CAA's new draft release?"*

George Weitz: "The CAA and the CAB have worked very diligently to try to iron out some of your problems. My department's job is to deal with everything except the air carriers. We want to keep abreast of your safety problems to promote sound airworthiness safety practices, and obtain compliance with established standards. At the present time we are undergoing considerable change in concept in our department. The taxpayers are contributing an average of $33,000 per year for every one of our 89 aviation safety district offices. You people and millions of others have decided to give us that money to promote safety. What we are trying to do is give you as much for your money as we can. To make our maintenance agents more effective, safety-wise, and to get after the problems of major importance instead of spending time on the lesser problems that come up over a year, this draft release went out. Under progressive inspections, the inspection may be conducted by various individuals throughout the country when the airplane is enroute and the responsibility is tied to the person actually conducting the inspection. This permits everyone to get the maixmum utilization out of their aircraft.

"Another objective is to disseminate more safety information, but the CAA can offer only a part of it; more must come from the manufacturers and industry groups. Many of the problems you fellows have mentioned here are due to lack of information on the part of overhaul agencies. The one thing we think helped you business-plane operators was the establishment of certificated repair stations. Today, the standards of maintenance operations have been raised and you fellows can deal with financially responsible people.

"About a year ago, the National Aviation Maintenance Council was established and that group is endeavoring to set up a code of ethics, a sort of Duncan Hines rating that they can give these repair stations. The NAMC is trying to increase the minimum standards so that the shops will do a better job for you. I think it behooves every one of you to look into this NAMC and see what a good job the group is doing."

Hal Henning: *"Mr. Little, there has been some discussion among a number of us regarding what the CAB might be doing in the way of granting recognition to business-aircraft operators as a particular group rather then throwing them into the general aviation hopper. Certainly the characteristics of business-plane operation are not the same as the scheduled airlines nor are they the same as the private flier. Can you enlighten us as to the CAB's attitude in this regard?"*

W. B. Little (*Bureau of Safety Regulation, CAB*): "We realize you have problems peculiar to your type of operation, and consideration will be given to any constructive recommendations made with respect to those problems."

George Weitz: "Tell me, are you executive-plane operators thinking about going to a third group, an executive-type group?"

Robert Ellis: "That idea was kicked around a few months ago, but I believe the consensus now is that we don't want a special category for this executive group."

Hal Henning: *"This question always comes up. It seems that business flying is neither fish nor foul. The scheduled airlines and the irregular carriers have a definite set of rules and regulations that they must comply with because they are common carriers. They are offering their services to the public for hire. Technically, we are not in that category. We're presently classified with the man who owns a private airplane and flies it for pleasure. Under the present regulations, a pilot with a private license and an instrument ticket, flying a lightplane equipped with a range receiver and a low-powered MF transmitter on 3023.5, can and does operate under instrument conditions and is perfectly within the regulations. Generally, business-aircraft operators voluntarily equip their aircraft and maintain their operations on a scale similar to that of the scheduled carriers while still being considered, regulation-wise by CAA/CAB, as private-plane owners.*

"There have been many attempts to define business-aircraft operation, but I don't think any group has come up with a satisfactory definition that would include just that classification of operator. Now I am not implying that we are advocating a different set of regulations, but I am wondering whether or not this new draft release is working in that direction."

George Weitz: "In my opinion, to put you fellows under special regulations would do you more harm than good. However, we are trying to work into the regulations the answers to some of your problems. This progressive inspection, for example, was brought into the proposals largely because of the need for such a thing by the corporate operators.

"Speaking of this progressive inspection, I'll tell you the same thing we told our agents last month. They should discourage people from going to this progressive inspection where they lack the facilities, the records, the planning and technical material that goes with it. Progressive inspection was designed especially for corporate owners; it was not designed for the average pleasure pilot. It is a controlled maintenance system and implies all that goes with control. If you are in the general aviation regulation field and the regulations are doing the job you want, I can't see much point being separately identified."

Hal Henning: *"I quite agree with you. But why do we need to change the present regulations? What is the necessity for the draft release in changing the present regulations?"*

George Weitz: "I wish I could quote the words of President Eisenhower, who indicated that safety isn't just the CAA job; it's everybody's job, and the directive from on high is to share some of this responsibility. CAA has been underwriting the so-called annual inspection for some 20 odd years, and we all know what that means today. There was a time when it was considered a double inspection, but that vanished in 1946. We have explained to you that we only have 104 maintenance agents and their time is spread pretty thin. All of you fellows that are in business know what you do when you find you are pouring money into something that is relatively unprofitable. The annual inspection and all the work that goes with it has cost us 20% of the agent's total time. In analyzing our agent's effective time over the last three years, we have found they are putting in about two days a week on direct safety items; the rest is just overhead. We have a management problem in that if we can't get out from under some of the relatively unimportant duties that the industry has demonstrated it is capable of doing we are going to go broke, so to speak, as far as our effectiveness is concerned. We want these agents to move in on the shop and places where the work is being done. We want to get more of the malfunction and defects business, accident investigation, etc. We need that 20% very badly. That, basically, is what brought on this draft release."

Robert Ellis: "We think it's a fine thing and we're 100% for the idea. We need less regulation instead of more, and this draft release is a trend in the right direction."

Hal Henning: *"Amen to that, Bob, but I'm wondering if this means less regulation since it seems to be just a deviation from the principle that we are operating under at the present time."*

George Weitz: "As pertaining to corporate operation, this progressive inspection is something you boys are responsible for. Our agents are not approving any progressive inspection; they are to assist you when you are stuck, but its your responsibility. If you fall on your face, at least you have the privilege of doing it yourself and not being kicked there by the CAA. All we ask is this, if you have the facilities, if you have the people to do the job and the equipment and the place to do the job, you send us a letter and tell us you are operating on that system and that you comply. Our agent isn't going to run up to your place with a rubber stamp and grab your manual. He'll simply drop in on you and monitor your operation; if you've gone overboard, he'll tell you. Essentially, that is what the thing is and that's how we intend to operate."

Leonard Lee: "From what I can see the proposed regulation is only legalizing what we all presently are doing. It is taking the CAA agent off our backs for the kind of maintenance we are giving our own airplane. I'm wholeheartedly in favor of this method and the procedure involved. It's a big step in the right direction."

Ted Stilwell: "We at AiResearch agree with Mr. Lee. It will work out all right."

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AVIATION PRODUCTS

Hal Henning: *"What about the one-airplane operator? He has a pilot, a co-pilot and maybe a hangar in which to store his airplane, but he hasn't any maintenance facilities. What does this mean to that type of operator, the one who is totally dependent upon outside services for his maintenance work?"*

George Weitz: "We tell the operator that keeping his airplane airworthy is his responsibility. We require one periodic inspection a year from him, and this is no more than the annual inspection was. We suggest that he use a well thought out maintenance plan even if he doesn't deal with records and such. He can use the old standby 100 hour inspection or he can use what we set up as a periodic inspection and break it down into various increments. We give him the greatest flexibility; the only thing is, he is responsible for it. If he chooses to go to a progressive, then we will help him all we can. However, I believe that the manufacturers soon will put out their own progressive system for that type of business-plane user. I don't believe there will be any particular problem for that type of operator."

Hal Henning: *"Then instead of the CAA annually certifying an aircraft as airworthy, the owner takes the responsibility of certifying it through a person whom the CAA says is qualified to pass on that?"*

George Weitz: "Essentially, that is correct. In this manual material that we ar getting out with Mr. Little's outfit, we hav attempted to draw very definite lines o responsibility which have been understoo all these years but have never been pu down in writing. We feel that the prim responsibility of this authorized specialis is to tell a man what is wrong with hi airplane if there is something wrong wit it, and he has to give it to him in writing The owner is responsible from then on He's the guy that controls the mainte nance; he pays the bill. If he doesn't tak the word of the inspector as to what i wrong, then he is 100% on the hook him self. The pilot also is responsible in tha he is responsible for safety of flight, no detailed airworthiness, but as the resul of the pre-flight. The mechanic is respon sible for doing the job in accordance wit established standards."

Hal Henning: *"Ted, as an operator d you have any comments?"*

Ted Wild: "I don't think so. All of ou problems with regard to overhaul agencie have worked out nicely. We have brough the respective agencies together and w have gone over our requirements with them We give the overhaul agency sufficient ad vance notice, usually about two month and, as a result, have been well satisfied."

Joe Salzman: "We do almost all ou own work as far as our airplanes are con cerned. Any major troubles that we ma have had with an overhaul agency probabl were as much our fault as the agency's Certainly there have been no problems tha couldn't be worked out satisfactorily.

"Perhaps one of the reasons we get int such discussions as this is because thi type of flying has gone from luxury to necessity. As a luxury, the man who wa paying the bills seldom cared how muc his luxury cost him or how long the air plane was down. But when his airplan became a necessity, he began to ask wh his airplane had to be down so long o why the maintenance cost so much."

Hal Henning: *"Do you of the overhau or manufacturing industry have any com ments to make?"*

John Frazee: "As a manufacturer, w want you gentlemen to know that we ar particularly interested in your problem If there are any problems that you feel ar peculiar to your type of operation, w would do whatever we can within the limi of our facilities to help with them."

Hal Henning: *"Mr. Dickerson, may I as you to differentiate between inspection tha determines the condition of a piece equipment and inspection to determine th quality of workmanship?"*

George Dickerson: "We have had bot types of quality control. For many yea Quality Control Inspection in our shop ha reported directly to the management. W have the final word on what goes in th engine. We control quality from the tim the engine comes into the plant in th customer's box until it goes back out that same box. We even have our own te inspectors in the test house. Every pha of the overhaul operation is controlled b inspection, and that includes assembly as well as disassembly when we deci whether or not the part is serviceable.

"On the subject of costs, I think w

(*Continued on page* 64)

Business Aircraft

(*Continued from page* 17)

eplacing the family auto. It is well-known hat this rosy prediction never came to pass. While the aircraft manufacturer and he airport service operator wondered what he future held in store for them, a revolutionary concept of aircraft utility was quietly taking form. By 1950, it had grown with such vigor that it startled the aviation industry and opened up—like Aladdin's lamp—new vistas for thousands of long-earthbound American enterprises.

With little fanfare the businessman had become airborne. Aircraft for business use was not limited to just the larger and wealthier firms. Hundreds of small concerns had learned that their plane had revolutionized long-accepted business methods and procedures, opened undreamed of markets, streamlined operations, introduced highly profitable new sales techniques, saved time and money, and bolstered company morale from bottom to top.

What has been the end result of business taking to the air? The growing demand for business airplanes has brought new prosperity to the aircraft manufacturer. The largest percentage of all sales last year was made to the business flying group. So far this year, sales figures indicate that a new record will be achieved in this field.

The distributor, supplier and manufacturer of aviation equipment items are faring exceptionally well, reporting high volume sales. Airport operators and service organizations also are profiting handsomely from the steady increase in the numbers of the conservatively estimated half-billion dollars being spent annually to keep the business air fleet aloft.

One may question how the commercial airlines feels about the tremendous swing to business-owned and -operated aircraft. It would appear that whenever a business plane takes off with company personnel aboard, that fewer dollars are being deposited in the airline cash register. Strangely enough, just the opposite is true. The business airplane actually is proving a boon to airline travel. Once a businessman flies in any type of aircraft, he usually becomes *sold* on the time-saving and speed advantages of air transportation. In a company airplane, he spends far more time in the air and when it is not available, he automatically turns to the airlines. As an illustration, one business firm reported that it bought its first airplane in 1948. At that time, there were only 50 airline travel cards being used throughout the entire organization. Now over 300 are in use and airline travel is up some 600%, despite a company fleet of four airplanes. No wonder the airlines will readily admit that business aircraft are sizeable sales producers for their excellent services.

To find out how the businessman is utilizing airplanes and the variety of commercial concerns employing them in their day-to-day operations, a survey was recently conducted. Returns showed that hundreds of various types of businesses are operating aircraft. In the membership of the National Business Aircraft Association alone, over 100 varieties of business endeavor are represented. Just to list a few, there are: automotive, beverages, banking, chemicals, coal, construction, consulting, electrical, electronic, engineering, equipment, finance, foods, natural gas, glass, insurance, manufacturing, merchandise, metals, mining, milling, petroleum, processing, paper, publications, real estate, radio and TV, rubber, services and sales, steel, textiles, tools, transportation, utilities, and numerous others.

Many companies reported using their planes for supervision and administration, sales and purchasing, real estate development, transporting technicians, engineering surveys, electronic experiments, moving special equipment, hurrying repairmen and materials to other plants. The prime use, however, was to speed executives and their staffs to conferences, explore new markets, deliver customers to scattered plants. The different uses could go on and on . . . too numerous for mention here.

Some 90% of the reportees stated that business aircraft had greatly improved the productivity of key executives, enlarged market coverage, stepped up sales and production, increased annual income. Forty-five per cent claimed substantial reduction in travel expense, marked decrease in travel time, and development of new products because of expanded market areas. About 25% were undecided as to whether they had financially benefitted by aircraft ownership but many indicated considerable improvement in internal control and management.

Today's business-aircraft fleet embraces nearly every type of aircraft that is flyable. Even small jet-powered airplanes are now available for the businessman and turboprop transports already have been ordered by several major corporations. Statistics reveal that about every third single-engine plane is a four-passenger type. The next largest grouping include a variety of civil and converted military multi-engine aircraft, mostly twin-engine. Some of the larger firms operate four-engine airplanes. The average seating capacity of the twins is six passengers, excluding the flight crew. The most popular types of twin-engine aircraft are the Douglas DC-3, Beechcraft 18, Lockheed *Lodestar* and *Ventura*, Aero *Commander*, Piper *Apache*, Cessna 310, Beechcraft *Twin-Bonanza*, and several twin versions of the single-engine *Navion*. The largest number of single-engine aircraft in use are produced by Cessna, Beech and Piper.

Most of the business aircraft winging over the nation today, particularly the larger twin-engine types, were well-known before business flying became the most important and progressive segment of non-commercial civil aviation. The majority of these planes were designed for airline or military use but have been converted or modified and adapted to meet specific company needs for air transportation. The aircraft interiors are models of carefully planned and artistic design. Picture windows are installed in many planes and afford almost unlimited outside visibility for the passengers. Deep-cushioned seats of the swiveling type, curved divans, couches, fold-up tables, small desks, typewriters, tape-recorders, transcribers, radio telephones, compact galleys and lavatories are some of the things that contribute to

comfortable, practical and efficient busine air travel.

Harmonious interior color schemes a popular with increasing use of past shades to provide a restful and relaxi atmosphere. Cabin noise is reduced to minimum with sound-absorbing fabric plastics, and leather.

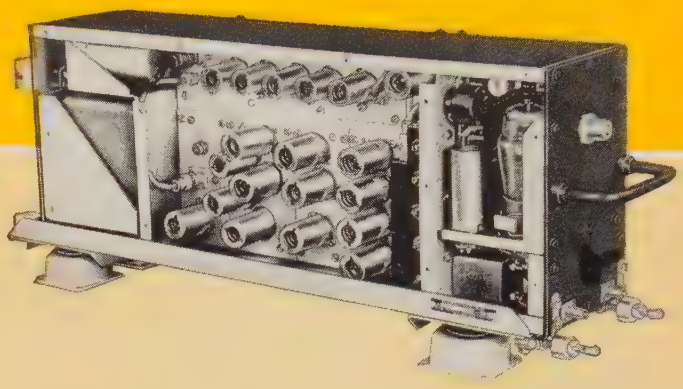
Business-aircraft users also have becon the biggest purchasers of the latest ty communications, navigation, and safe equipment. Most large business transpor are as well equipped and, in some i stances, better equipped than airline ai craft. Professional pilots, generally wi extensive airline, military or commerci experience, are at the wheels, capable flying anywhere, anytime, under all conc tions of weather. The businessman's d mand for safety, efficiency and economy air transportation has resulted in install tions in his aircraft of new equipment d signed originally for airline operations. notable examples, business airplanes we first to widely use the VOR (very high fr quency omnidirectional radio range) a the DME (distance measuring equipmen as valuable aids to safe and time-savi navigation from point-to-point around t nation. Currently, business operators a adding airborne radar to their flight equi ment to insure advance spotting of b weather areas and to minimize flyi through thunderstorms, turbulent air, i and snow.

The number of business aircraft ope ated vary with the size and nature of t owner's business. Many companies ha only one airplane, either single or mul engine. Others operate several sing engine and one multi-engine or sever multi-engine and one single-engine a craft. Some of the larger organizatio have fleets of mixed aircraft ranging an where from five to 50. It is not unusu for a company to operate more aircra than a scheduled airline.

Although the future of business flying highly promising, with a conservative es mate of some 40,000 business aircraft use by 1965, there are a number of curre problems confronting business operato commercial airlines and private flyers. T rapid increase of air traffic in large metr politan areas is creating slower moveme of aircraft during landings and take-off many airports, particularly in industri areas, are inadequate to accommodate types of business airplanes; poor servic storage, maintenance, and overhaul a causing mounting concern in some sectio of the country; the uncertain status of t Civil Aeronautics Administration VO DME facilities network in light of milita development of the TACAN system (Tac cal Air Navigation) has business operato worried; the increasing hazard of tall T structures (some now over 1500 feet) densely populated metropolitan areas is national issue; the rapid expansion military operations with joint-use of ci airports causing confusion and bickerin the mixed air traffic of jets, turbopro piston-engine, and helicopters with wid varied speeds requiring expert handli by already overworked air traffic controll and airways personnel; the continued del of aircraft manufacturers to provide exclusively designed business airplane

SPECIAL REPORT
ON NEW RADAR SAFETY BEACON

An announcement of vital interest to airline and corporate aircraft management, engineering and flying personnel, concerning a significant contribution toward greater safety and efficiency of operations.



HERE AT LAST! Wilcox is proud to announce the acquisition of the exclusive, world-wide manufacturing and distribution rights for the airborne Air Traffic Control Transponder (Wilcox Model 714 Radar Safety Beacon) designed by Melpar, Inc., (subsidiary research organization of Westinghouse Air Brake Company).

The unit is the result of three years of intensive research by Melpar engineers under the direction of Vernon Weihe and Robert Boymel. It was designed to ARINC characteristic No. 532.

It promises far more effective Airport Surveillance Radar, especially in view of the fact that CAA is now equipping major traffic centers with ground interrogators.

ASR HAS HAD PROBLEMS. Airport Surveillance Radar has been hindered by the difficulty of getting quick, positive identification of each aircraft on the radar scope. Target surfaces are often not large enough for good indication. Bad weather affects readings. Identification has been possible only by time-consuming flight maneuvers.

BUT NOW, THE SOLUTION IS HERE! The Wilcox Model 714 RADAR SAFETY BEACON erases most limitations of ASR. It's an inexpensive airborne transponder. A signal from the ground radar hits equipment in the aircraft, triggers a transmitter which sends the coded signal back. Good, clear, strong indications on the radar scope are virtually unaffected by sleet, snow, thunderstorms, congested traffic conditions at all distances up to the limit of radar range, on all types of aircraft!

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1. You know your aircraft is positively identified!
2. You don't have to go through flight maneuvers!
3. You are provided with extra measures of safety in busy terminals, in border-line weather conditions, where IFR and VFR traffic mix!
4. You know your aircraft will be in a precisely defined section of air space--preventing collisions!
5. You land faster. Wilcox RSB makes greater accuracy of landing interval control possible. More planes land per runway per hour!
6. You know the pattern is more flexible! Errors in speed or position can be spotted and corrected faster. The radar man can pull you out of the pattern and land you--even at a strange airport--quickly--in case of emergency!
7. You merely request that a code be assigned you when flying over an Air Defense Identification Zone (ADIZ). You are identified during the entire time you're in the area.

HAS IT BEEN PROVED? Several thousand hours of flight time have been accumulated on the Wilcox Type 714 Radar Safety Beacon by Lake Central Airlines! They installed six prototypes on aircraft operated in regular scheduled service.

WHEN CAN YOU GET THEM? Production and delivery is scheduled for late 1955. This gives you ample time to install, coinciding with CAA schedule for interrogators now being installed on ASR radar at major terminals.

WRITE, WIRE OR PHONE FOR COMPLETE DETAILS!
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the 300-mph range with pressurization, short-field performance, and long-range operations, gripes many prospective buyers.

It is gratifying to know, however, that none of the problems mentioned are insurmountable. Much progress has been made toward solving many of these problems as a result of the civil and military agencies and aviation industry groups working together on mutual objectives.

It is clearly evident that the long-range plans of American business include increasing use of the airplane as an essential tool to enlarge and advance commercial interests. The year 1955 may well prove to be one of the most significant years in the phenomenal history of business flying. The volume of business-aircraft flying is expected to greatly exceed last year's remarkable figures. It is predicted that the number of flight hours will top four million; plane miles flown will reach 700 million; passengers carried will approximate seven million; and the total number of business aircraft will climb to 23,000.

Truly, the growth of business flying has been spectacular. If Lord Byron's statement over 150 years ago, "The best prophet of the future is the past" is still acceptable for forecasting expansion in this vigorous field of civil aviation, then there is no apparent limitation to the utility of aircraft for the American businessman. Once he has learned to accept the airplane as a practical way of solving the ever-present non-productive hours spent in traveling by slower or more inflexible transportation means, he may find that its use spells the difference between business success and failure.

Executive Plane Interior

(*Continued from page* 25)

is easily removed for cleaning, and is replaced with minimum effort. Seat adjustment attachments have been given a new streamline appearance, and the metals used require infrequent polishing. Tray or table fixtures have been given similar treatment.

The use of foam rubber in seat and back cushions is also important to maintenance as well as to comfort. It has been found through years of testing that this material maintains the original shape of the seat to an incomparable degree.

Another outstanding contribution to progress in seating has come about through the versatility of track mounting. Standardized track mounting gives greater flexibility to space utilization, and in the larger ships makes rearrangement quite simple. A special track-mounted fold-away type of chair can be had which makes conversion of a passenger ship to a cargo plane possible in a matter of minutes. For companies operating in foreign countries, a conversion of this nature has many advantages.

Both luxury and utility dictate the ultimate interior design of a business plane, but there is no need to sacrifice comfort in either. Enthusiasm for future developments is apparent in any department of the Hardman Company. Its' an enthusiasm born of progress in a field which will serve more people in the long run than either their well-known chairs for carriers or military planes.

The watchwords for future designs are an unyielding standard of quality, styling and low maintenance cost. If the corporate owner wants an office in New York, a living compartment in Saudi Arabia, or a clubroom in Los Angeles, he'll have it with all the comfort and eye appeal modern engineering can provide. And he'll have it with luxurious swivels, berthables and television, too, if he wants it. This is an age of business-plane progress. Name it the chances are you'll get it.

Can You Use A Plane?

(*Continued from page* 23)

Type of Plane	Dollars/Hour
Douglas B-23	383
Lockheed *Ventura*	279
North American B-25	250
Consolidated B-24	247
Lockheed *Lodestar*	201
Grumman *Mallard*	191
Douglas DC-3	184
Lockheed 12	119
Twin Beechcraft	109
Grumman *Widgeon*	97
DeHavilland *Dove*	94
Ryan *Navion*	72
Cessna 195	55
Beechcraft *Bonanza*	34
Cessna 170	21

These costs may vary plus or minus 25%

In most operations, about 60% applies to fixed charges, such as insurance, hangar rent, pilot salaries and depreciation. The other 40% covers gas, oil and other maintenance items.

Examples of how the cost of aircraft operation varies with use may be shown by the Piper *Apache* which costs a little over 28 cents a mile if it is flown 300 hours a year, but only 13 cents a mile at 1,000 hours. That includes gasoline, oil, depreciation, the pilot's salary and all other operating costs. If the *Apache* carries its full complement of four persons, its per-passenger cost at 1,000 hours is a little over three cents a mile, compared with seven cents a mile at 300 hours. If a single-engined plane is operated 1,000 hours a year or more, its cost may be as low as one and one-half cents a passenger mile.

Faster and longer-range planes may cost more. The DC-3, for years the standard commercial airliner, costs about $1.00 a mile to operate if it is flown 1,000 hours or more a year, or five cents a mile for each of its approximately 20 passengers. Larger airlines have per passenger costs of as little as two or three cents a mile with all seats occupied. Commercial airline fares range from four and one-quarter cents a passenger mile to seven and one-half.

The operations of a company may be large with extensive personnel travel to areas which have inadequate schedule transportation service. Even so, it is conceivable that economies may not permit the operation of company aircraft to give all the service felt desirable. In such instances, it is necessary to weigh the value of the personnel's time against the cost of providing better service. As previously stated, these economies earned through savings of time are really the most important factor in business-aircraft operation and weigh heavily on the selection of aircraft for such service. (*Continued next page*

All present-day business concerns owe it to their top executives and traveling personnel to consider the operation of one or more business aircraft. Of course, when they go looking for an airplane they should know something about the business requirements as discussed previously. With this in mind, they can look intelligently over the impressive list of planes available today on the aviation market. With the information at hand on the need for a company plane, considerations should be given to the crew to fly it and the manner in which it is to be maintained. Proper scheduling is also an important factor; in fact, the selection of pilots, maintenance and scheduling are so important that another article will be devoted to them.

Virtually every company which has created a business-aircraft operation and discontinued it on a later date, has done so because of mis-management of one or more of these factors—selection of pilots, establishment of improper maintenance and poor scheduling.

No other phase of the aviation industry has taken hold so readily and grown so fast. Business flying has truly been the stabilizing force of the private aviation industry and it is only beginning, according to leading authorities. There is a great selection of safe, comfortable, serviceable and economical planes available today to the company who seeks a business plane. By carefully selecting the plane which fits its business needs, a company can be in a position to do battle for the future business of the world.

NAVICOM

(*Continued from page* 40)

Mohawk Bus. Machine Corp. 944 Halsey St., Brooklyn, N. Y., announces a new pocket-size recorder the Midgetape. Wt. 3 lbs. measuring 8½" by 3⅞" wide by 1⅞" thick. It is portable and will fit either in cabin or cockpit. Has three controls and operates on two long-life batteries. Cartridge-loaded tape simplifies handling, makes recordings easy to carry or mail. It records up to one full hour of continuous transmission, which should be ample for the average radio usage on a flight of at least six hours. Tape cartridges are re-usable and can be erased automatically.

Battery life varies from 45 hours to 100 hours (for the "B" battery). Frequency response is from 200 to 5000 cps within 5 db. Recording level is indicated by colored marks on the volume control. Record playback time is the same one hour.

The Midgetape is delivered with a one-hour recording cartridge, crystal microphone, earphone and batteries, lists at $249.50. The tape can be played back on any standard machine employing similar-type tape, and stethotype earphones or individual earpieces are available. Also an AC-DC amplifier has been designed for loudspeaker playback. Power converter is available to operate Midgetape from 110-volt AC Telephone mikes, chronograph-style wristwatch mikes for Dick Tracy pilots and concealable lapel pin mikes and shoulder-holsters for convenience suggest interesting handy applications in the cockpit.

NAVICOM

(*Continued from page* 61)

Chicago Midway Runway Marker Under Attack

The tragic Braniff crash at Chicago Midway last July 17 in which 22 passengers and crewmen were killed has highlighted a condition which has been a source of concern to airline and professional business pilots.

There were all sorts of visual instrument-landing aids. In the desire to present the ground-seeking pilot on approach with the most easily recognizable means of transitioning from his gauges to ground and runway reference, approach and airport lighting engineers have designed and installed types of flighting designs on poles and vertical frameworks graduated in height according to approximately the angle of descent and required clearance.

With the exception of threshold lights and so-called range or end-of-runway lights on the ground close to the end of the runway, it is a rare sight to find anything other than frangible objects in the "undershoot" area preceding the actual runway surface. Chicago Midway is noted (infamously) for the presence of raised concrete numerals and arrows 12" high supporting illuminated runway numbers in the undershoot area. Two premature touchdowns prior to the Braniff crash resulted in extensive damage to a Northwest DC-4 and an American Airline Convair.

The ALPA has used Braniff crash as a damning bit of corroborative evidence as to criminal negligence of the Midway Airport's Management in refusing to remove these obstructions. Fact that surface-level illuminated numbers would do the job, ALPA points out in the argument. Management claims that cost of removing obstructions is prohibitive in terms of safety to be gained!

They convinced the CAA Administrator that obstructions are "highly beneficial landing aids" although a concensus of professional and non-professional pilots fails to indicate any advantage to their being made of extremely hard and immovable 12" blocks of concrete!

Braniff crash issue is raised solely because "numerous pieces of radio equipment and cockpit components were found in numerals of runway markers." The crash was the result of earlier contact with objects outside of airport boundary but undoubtedly the high degree of destruction and rending of the aircraft with resultant high loss of life was considerably effected by contact with concrete obstructions in undershoot area instead of a smooth, if hard, flat surface.

It appears that, unless some action forces government authorities to declare this situation sufficiently hazardous to warrant curtailment of effective runway length and therefore drastically limit use of the airport by larger aircraft from which the airport derives its greatest revenue, the obstructions will have to be eventually removed as monstrous, high gas tank was years ago by wiping them out of existence with a combination of aircraft metal and human tissue!

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(*Continued from page 56*)

can improve that picture by closer liai between the aircraft operator and the ov haul shop. In many cases we know history of the engine before it comes in we know the operator and what he wa All of that helps to reduce both cost a turn-around time. After all, if we h to spend time asking questions, that time you are paying for and it also del getting the engine back in the air."

Hal Henning: *"To summarize the marks made relative to the three classifi tions that have been under discussion he it seems that we have the unanim opinion that the role of the pilot in maintenance of business aircraft must tailored to the particular characteris of the individual company's operation.*

"On the second phase of the probl the role of the engine, airframe and co ponent parts manufacturers and overh shops, the discussion seemed to me to close a noticeable lack of an organi medium for the exchange of useful formation. In other words, we all somewhat guilty of not keeping good r ords and, therefore, are not always s plying a condition report which would helpful to the overhaul shop. However believe all of us are beginning to rea that preventive maintenance is depend upon a good system of record-keeping. many years it has been an established c tom of the engine-overhual shops to o its customers condition reports; this cust should be carried through to the co ponent overhaul shops so that, between all records can establish normal life pectancy of the various components enable us to carry on preventive mai nance rather than corrective maintena

"George Weitz, would you summarize third phase of the discussion for us, nam the role of the CAA and the CAB in business-aircraft maintenance problem?

George Weitz: "Both the CAA and CAB are striving to take unnecessary r ulation out of business-aircraft operati and to put it on a common sense ba The time saved thereby will help us to a better safety job. We also are endeav ing to disseminate more and more infor tion vital to your operations.

"To close my comments, I'd like to g you some idea of the size of your prob with respect to engines. There are 141 ra powerplant repair stations, 25 of wh deal in the larger engines that you pe use. Your problem, therefore, deals w those 25 stations. I suggest you get gether with that group and work out improvements that are needed. I think are anxious and willing to do so."

Hal Henning: *"Reviewing this discus produces two salient points that were peated and thereby appear as a theme*

"1. Cooperation between all members this working fraternity, when used a two-way street, will produce profitable sults, and

"2. A well-organized medium for change of information is urgently nee Who will step up to this and be Moses to lead us out of Egypt?

"Thank you, gentlemen, for the gene and beneficial contributions that each you has made to this interesting and portant Round Table discussion."

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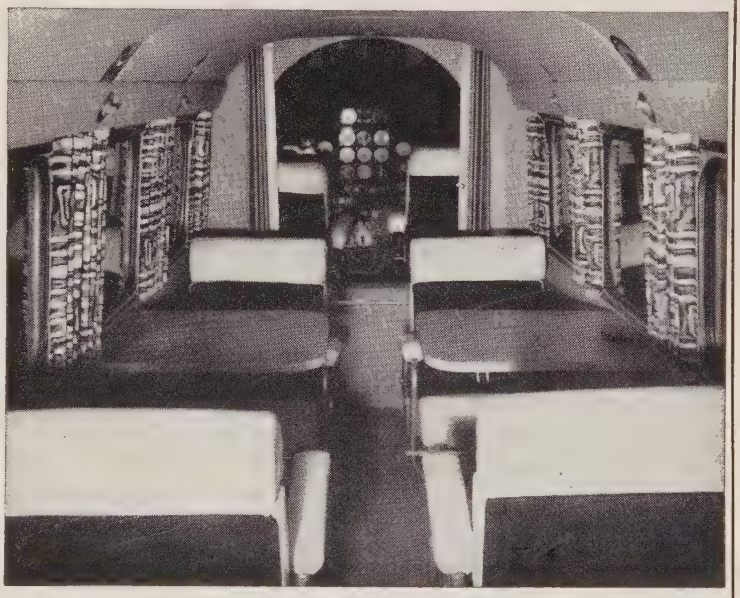

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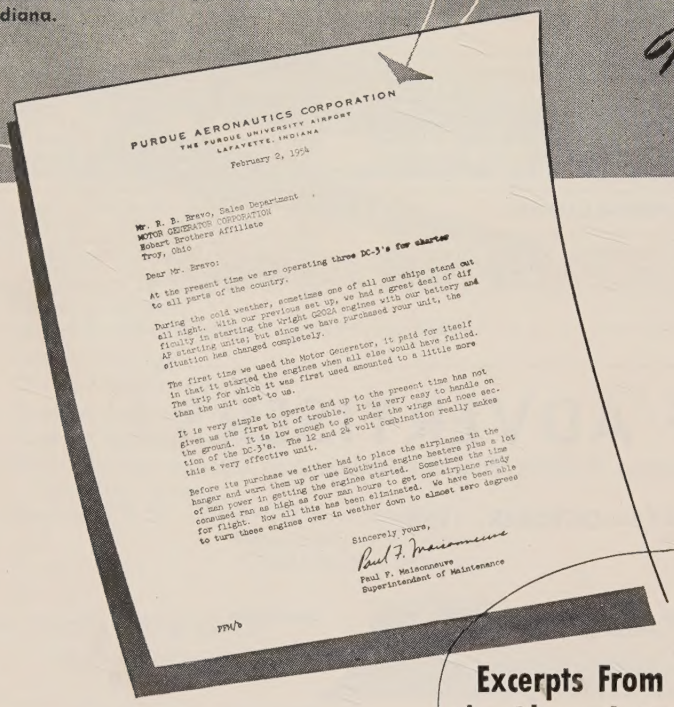

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Sincerely yours,

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Paul F. Maisonneuve
Superintendent of Maintenance

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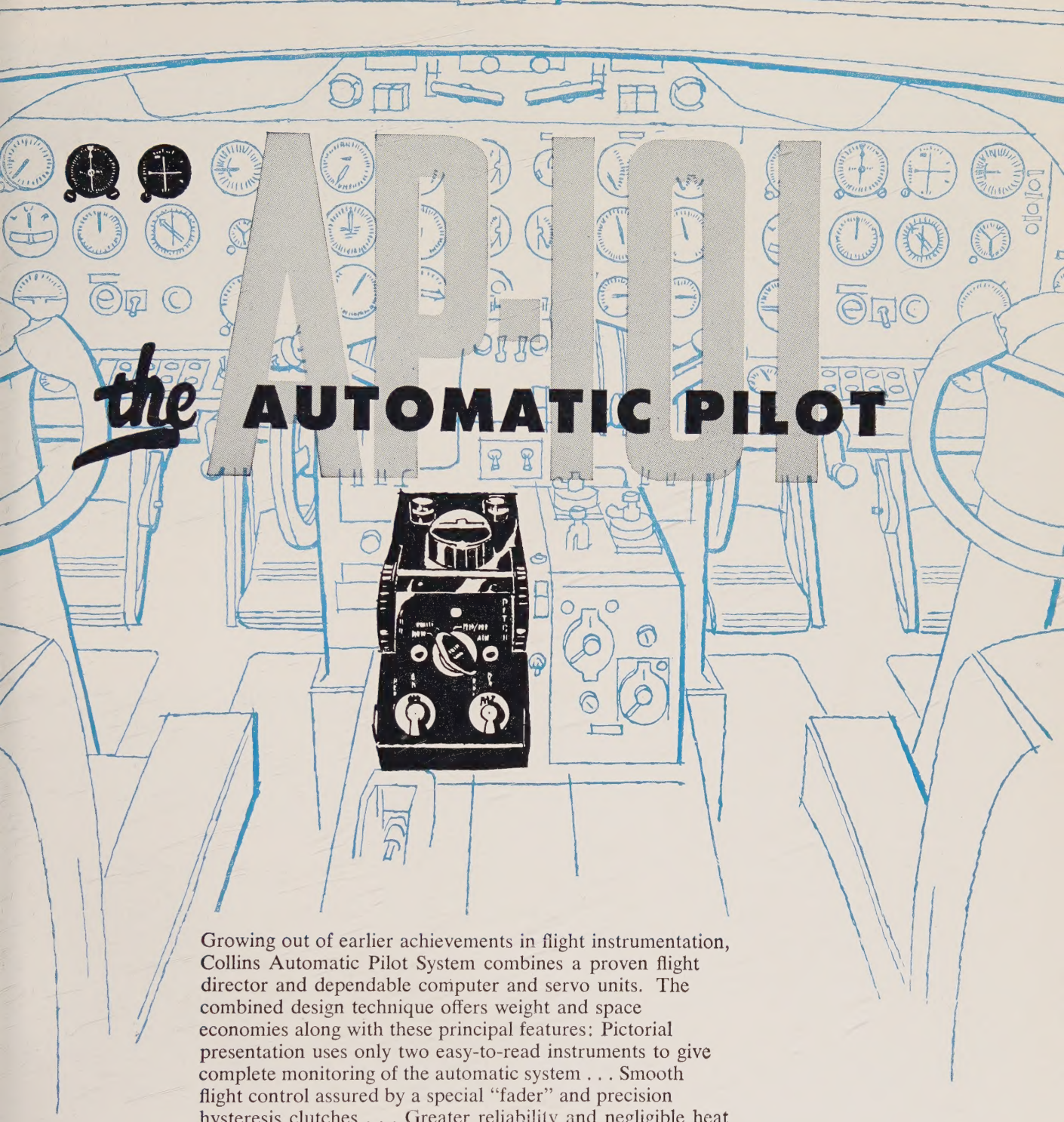

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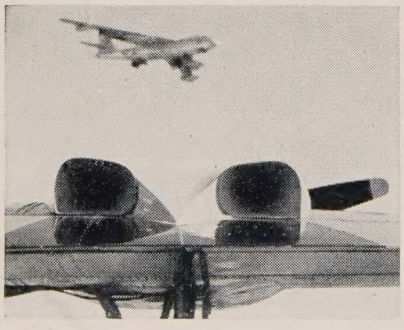

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